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ERRATA.

- Vol. 27, No. 3, p. 255, 2nd line of 5th paragraph, for carrier *read* barrier.
 Vol. 27, No. 6, p. 459, 2nd summary, line 7 of text, for *opressa* read *oppressa*.
 Vol. 27, No. 12, p. 963, Cawston summary, line 2. Between " and " and " in man," insert "has been reported."

TROPICAL DISEASES
BULLETIN.

Vol. 27.]

1930.

[No. 1.]

PLAGUE.

- i. LASNET. Aperçu sur la fréquence de la peste dans les colonies françaises au cours des dix dernières années. [**Plague in the French Colonies in the Last Ten Years.**].—*Ann. de Méd. et de Pharm. Colon.* 1929. Jan.-Feb.-Mar. Vol. 27. No. 1. pp. 5-19.
- ii. CAZANOVE. La peste au Sénégal (1924-1927).—*Ibid.* pp. 20-33.
- iii. CARTRON. Note sur l'épidémie de peste de l'année 1928 au Sénégal.—*Ibid.* pp. 33-43.
- iv. LEFROU (G.). Rapport sur une mission d'étude de la peste au Cayor (Août 1928).—*Ibid.* pp. 43-64.
- v. SOREL & ARMSTRONG. La lutte préventive contre la peste dans la circonscription de Dakar et dépendances durant l'année 1928.—*Ibid.* pp. 64-72.
- vi. THIROUX. La peste à Madagascar (1923-1928).—*Ibid.* pp. 72-84.
- vii. FONQUERNIE. Fonctionnement du service de la peste au Bureau Municipal d'Hygiène de Tananarive en 1927.—*Ibid.* pp. 85-94.

i. Inspector-General Lasnet gives a summary of the outbreaks of plague in Indo-China, Madagascar, Réunion and French West Africa during the last ten years. Tables are given of the cases occurring in the years under review. In Indo-China the most marked epidemic period is during April and May, the hot season, with diminution during the rainy season. In a similar way the rat fleas increase and diminish with the changing seasons. Vaccination of all persons in threatened centres is compulsory, other usual sanitary precautions are taken and the number of cases has steadily decreased (see table, p. 8). The plague conditions in the other colonies are reviewed year by year with mortality tables. Vaccination has been generally successful and the natives are showing confidence in preventive measures. The other papers are individual reports from medical officers on the spot and provide material for Dr. Lasnet's summary.

ii. Lt.-Col. Cazanove gives the records of plague in Senegal 1924-1927 and a list of the various rodents found in the colony. Lt.-Col. Cartron (iii) carries on the record to the end of 1928.

iv-vii. These are well-written and interesting reports, but do not contain any new facts about plague. A useful bibliography is given at the end of these papers.

J. H. Tull Walsh.

LASNET. Aperçu sur la fréquence de la peste dans les colonies françaises au cours des dix dernières années. [**Plague in French Colonies for Last Ten Years.**—*Bull. Office Internat. d' Hyg. Publique.* 1929. Apr. Vol. 21. No. 4. pp. 587-600. With 2 figs.]

The author is Inspector-General of Health for the French Colonies and reports briefly on the occurrence of plague in Indo-China, Madagascar, Réunion and West Africa. The information is mainly statistical and has appeared in other journals. An interesting comparison of the attitude of the natives of W. Africa in regard to various vaccines is given. Oral vaccine, "pestedo" (Poulenc), is accepted, but there have been no satisfactory results. The aqueous vaccine (Pasteur Institute), which requires two injections, is not accepted, partly because it sometimes causes reaction. The oil vaccine of Dr. LE MOIGNIC [*this Bulletin*, Vol. 12, p. 361] causes no reaction and requires only one injection. The natives have confidence in this vaccine and accept it. Of the value of preventive vaccination there is no doubt.

J. H. T. W.

WU LIEN-TEH, POLLITZER (R.), CHIA-SWEE (Lin) & JETTMAR (H. M.). **Studies upon the Plague Situation in North China. With Appendices.**—*Nat. Med. J. China.* 1929. June. Vol. 15. No. 3. pp. 273-402. With 10 plates (1 map). [63 refs.] [Manchurian Plague Prevention Service, Harbin.]

It is not possible to condense these various studies. Much of the matter has in substance appeared in other journals [see also *this Bulletin*, Vol. 26, p. 518]. In a chapter of "General Conclusions," Dr. Wu Lien-Teh writes: A hopeful beginning has been made with the investigation of wild rodents and their parasites. Whatever may be their rôle in the spread of plague, we can definitely assert that the local rats suffer from plague and spread the disease. All rats examined were infested with *Xenopsylla cheopis*. Also human parasites (*P. irritans* and *C. lectularius**) appeared to share in the transmission of plague in the Tungliao outbreaks. In addition to the tarabagan-caused plague entering from Transbaikalia and Outer Mongolia, North China has to deal with endemic plague due to rats, etc.

J. H. T. W.

IIMURA (Yasuzo). [**An Outbreak of a Case of Plague in Osaka Harbour and Measures taken therefor.**—*Jl. Public Health Assoc. Japan.* 1929. June. Vol. 5. No. 6. [In Japanese. English summary p. 13.]

The writer states that on May 8th, 1929, a man from the steamer "Sumatra Maru" died of plague in the Seamen's Hospital, Osaka. The steamer had arrived from Bombay with cotton. The ship was fumigated and of 68 rats 3 were found to be infected. A little later a case of plague occurred on the "Gensau Maru," which had been in the

* "Inoculation experiments with both *Pulex irritans* and bed-bugs (*Cimex lectularius*) removed from the clothes and blankets of fresh plague victims gave positive results," p. 340.

same dock as the "Sumatra Maru." An infected rat was also found on "Selyo Maru," which arrived at Osaka from Bombay on May 12th. Due precautions were taken on shore, and except for one infected rat among 1,900 examined, the virus has not spread any more.

J. H. T. W.

CAZANOVE (F.). L'épidémiologie de la peste au Sénégal. [**Epidemiology of Plague in Senegal.**—*Rev. Prat. Malad. des Pays Chauds.* 1929. June. Year 8. Vol. 9. No. 6. pp. 266, 269-276, 279-282. With 2 maps in text.

This is more or less a compilation, but gives an interesting account of the existence of plague among human beings and rodents in Senegal. The author states that of all the French colonies in W. Africa, Senegal is the only one in which plague is always found; in a region limited to the maritime zone and the two sides of the Dakar-Saint Louis railway. The morbidity is not very high: 2.63 per 1,000 inhabitants in 1922 to 5.49 in 1927, the highest in seven years; mortality about 50 to 85 per cent. of cases. All the animals examined, except the hedgehog, are infested with *Xenopsylla cheopis* [see this *Bulletin*, Vol. 22, p. 373].

J. H. T. W.

SCHWETZ (J.). La peste au Congo. (Note préliminaire). [**Plague in the Congo.**—*Bruxelles-Méd.* 1929. June 9. Vol. 9. No. 32. pp. 914-916.

The "Anti-Plague Mission for Lake Albert" was organized by the Laboratory of Stanleyville, of which the author is Director. He has lately returned from a visit of inspection lasting two months and reports briefly on the work of the mission and on the general situation. Plague exists in several small foci on the west of Lake Albert. Twenty cases were proved in natives, and some in rats. The situation is not serious, but it will take some time to deracinate a disease endemic in the country for many years. A small permanent mission will remain to watch events.

J. H. T. W.

THIROUX (A.). Les vaccinations contre la peste à Madagascar. Les résultats obtenus. [**Anti-Plague Vaccination Results in Madagascar.**—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 412-418. With 1 text fig. [2 refs.]

Plague is endemic in Madagascar with outbreaks following a regular seasonal curve. The lowest point of the curve is in July and from then onward the cases increase and the summit of the curve is reached in January and February, to decrease again to July. Up to July 1927 only a small number, under 15,000, of vaccine inoculations had been given yearly. Between July 1927 and April 1929 400,000 inoculations were carried out, with the result that there was a decrease of 265 cases as compared with the previous year. The circulation of natives in provinces contaminated by plague is controlled by sanitary passports.

J. H. T. W.

KALINA (Georg). Der endemische Pestherd im zentralen Tjan-Schan. [**Endemic Plague Focus in Tjan-Schan.**].—*Zent. f. Bakt.* I. Abt. Orig. 1929. Sept. 28. Vol. 114. No. 1/2. pp. 50–54. [Sanit.-Bact. Inst., U.S.S.R., Tashkent.]

Central Tjan-Schan consists mostly of mountains and high plateaux. The author describes the geography, topography and climate of the district. He describes certain appearances of plague and gives a note on pneumonic plague starting in Basch-Kaindy. A list of the various rodents found in this region is given :—

Hares (*Lepus lehmanni*, *L. stoliczkanus*, *L. timidus*, *L. tolai*) ; marmots (*Arctomys baibacina*, *Ar. caudatus*, *Ar. centralis*) ; ground squirrel (*Citellus relictus*) ; field mice (*Microtus eversmanni*, *M. tianshanicus*, *M. socialis*, *M. ilaeus*, *M. arvalis* *Alticola gracilis*, *A. villosa*) ; hamster (*Cricetulus sangarus*) ; a gerbille (*G. montanus*) ; and the rat-like hare, *Ochotona rutila*.

J. H. T. W.

ZEISS (H.). V. Die Pest in Russland. I. Pestähnliche Lymphdrüsenentzündungen im Wolgadelta 1926. (Tularämie?). [**Plague in Russia. Plague-like Adenitis in the Volga Delta. ? Tularaemia.**]—*Muench. Med. Woch.* 1929. July 5. Vol. 76. No. 27. pp. 1137–1138. [6 refs.]

An account is given of epidemic prevalence of a disease with much similarity to plague, but with little mortality. Can it be tularaemia ? Mild cases remain ambulatory. Fever lasts from 3 days to 2 weeks and a painless swelling of glands appears in 10 to 12 days. The buboes seldom open and they disappear in from 2 to 7 weeks. The disease itself is over in from 3 weeks to 2½ months. Microscopic examination of blood and lymph gland pulp proved negative, but guineapigs inoculated with bubonic pus died in 7 to 11 days and subpassage could be effected from animal to animal. Tissues and organs contain the virus. Infective organs such as the spleen after 53 days in glycerine could still produce infection. In smears from the spleen small coccobacillus-like, Gram-negative structures, without a definitely sharp outline, were seen. No growth was obtainable on ordinary agar, but with the addition of serum there appeared 1 or 2 small transparent delicate colonies, which soon turned greyish-yellow in the centre. Coccus-like structures are more commonly shown by agar colonies, while bacillary forms are found in smears of organs. Agglutination to 1 in 800 was obtained with serum of inoculated animals that had recovered. In the course of investigation 3 persons became infected and 2 of these developed buboes. No definite idea of the mode of infection of human beings has yet been elaborated, but it is noteworthy that the epidemics have occurred with the flooding of rivers in spring, and that this rise in the rivers, especially when excessive, compels numerous water rats (*Arvicola amphibius*, L.) to take to the land and enter houses. The differential diagnosis lies between plague, climatic bubo, sodoku and tularaemia. Clinically the condition resembles tularaemia. It still remains to compare the Russian and American strains of *Bact. tularensis*.

W. F. Harvey.

ZEISS (H.). VI. Die Pest in Russland. II. Die pestähnlichen Seuchen an der Oka und dem Ural im Jahre 1928. Tularämie? [VI. Plague in Russia. Plague-like Epidemics on the Oka and the Ural in 1928. ? Tularaemia.]—*Muench. Med. Woch.* 1929. Aug. 9. Vol. 76. No. 32. pp. 1342–1344. With 1 text fig. [1 ref.]

The occurrence of a disease with similarity to plague has been discussed by the author as regards its occurrence in the Volga delta (see above) and its relation to tularaemia. Out of more than 800 reported cases on the Oka only 3 died. The disease had two well-marked forms, the glandular and the pulmonary. The pulmonary manifested itself as a severe diffuse alveolar bronchitis. Laboratory experimentation would seem to justify the conclusion that this is a plague-like disease, transmitted to man from water rats, and closely resembling the North American tularaemia.

W. F. Harvey.

SARCHI (G.). Die Pest in Russland. Zu obigem Artikel von Prof. Dr. H. Zeiss in Nr. 27 u. 32, 1929 dieser Wschr. [Plague or Tularaemia in Russia.]—*Muench. Med. Woch.* 1929. Aug. 16. Vol. 76. No. 33. p. 1382. [San. Bact. Inst., Swerdowsk, S.S.S.R.]

This is a note to intimate that an organism isolated during a plague-like epidemic in the Obdorsk district of Russia has been proved identical with the American *Bact. tularensis*. The disease therefore was undoubtedly tularaemia.

W. F. Harvey.

GAISKY (N. A.). [Sur la question de la peste spontanée chez les spermophiles.] [Plague among Spermophiles.]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 2. pp. 148–157. With 2 text figs. [4 refs.] [In Russian. French summary pp. 223–225.] [Inst. of Microbiol. & Epidemiol., Saratov.]

Spontaneous plague in spermophiles is sporadic in the endemic area, varying in type in autumn and after hibernation. Dead spermophiles may be found in the burrows showing pathological signs of plague but from which *Past. pestis* cannot be recovered nor any other bacillus that might have caused death. Plague among spermophiles, while changing its form and character, persists throughout the year, attaining its maximum towards the end of summer. Towards the end of autumn *Past. pestis* is distinguished by a diminution in virulence, scanty growth and by the formation of capsules and zoogloea.

J. H. T. W.

IIMURA (Yasuzo). [On Plague of *Lutreola itatsi itatsi* and *Gamasidae*.]—*Jl. Public Health Assoc. Japan.* 1929. July. Vol. 5. No. 7. [In Japanese. English summary pp. 4–5.]

The author states that during 1922 a dead weasel was found to contain plague bacilli in its organs. He suggests, without any proof, that the weasel was infected by mites on the bodies of rats [why

mites more than fleas?]. He further mentions that Dr. YAMADI, of the Government Institute for Infectious Diseases, succeeded in 1928 in infecting rats by means of Gamasidae.

J. H. T. W.

FLU (P. C.). Der Antipestbakteriophag und die Prophylaxe und Therapie der experimentellen Pest. [**Anti-plague Bacteriophage and the Prophylaxis and Therapy of Experimental Plague.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Aug. 21. Vol. 113. No. 5/6. pp. 468–473. [4 refs.] [Inst. for Trop. Diseases & Trop. Hyg., Leyden.]

Bacteriophage injected intravenously in fowls in the opposite vein immediately after injection of virulent plague bacilli did not exhibit in the circulating blood any sign of phage action. Therapeutic tests were instituted in guineapigs which received 1-100th loopful of a 24-hr. weakly virulent plague culture subcutaneously. The bacteriophage treatment, consisting of administration of 1 cc. subcutaneously, was begun immediately, 24 hours and 48 hours after the plague injection, but without any satisfactory saving result or much evidence of delayed death. Oral administration and subcutaneous injection of bacteriophage in white rats also gave little evidence of prophylactic or therapeutic effect.

W. F. Harvey.

NAIDU (B. P. B.) & JUNG (Jamedar Shamsheer). **The Relative Toxicity and Immunizing Value of Haffkine's Plague Prophylactic and other Anti-Plague Vaccines Compared.**—*Indian J. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 199–213. [1 ref.] [Haffkine Inst., Bombay.]

Three different types of vaccine have been compared: (1) Haffkine's plague prophylactic, which is a broth culture of highly virulent plague bacilli grown for 6 to 8 weeks and composed of culture medium, bacillary bodies and metabolic products, with human immunizing dose of 4 cc.; (2) an agar-culture vaccine, grown for 2 or 3 days, washed off with normal salt solution and composed of bacillary bodies, with immunizing dose of 1 cc.; (3) plague nucleo-protein of Lustig, which is an agar culture washed off with normal salt solution, dissolved by alkali and precipitated with weak acid. This precipitate is dried and is issued in the strength of 0.04 gm. nucleoprotein precipitate in 21 cc. alkaline solution, with immunizing dose of 7 cc.

Susceptible rats were employed as test animals and were immunized with 1/8th the human immunizing dose in the case of (1) and (3) and with larger doses in (2). The test dose consisted of 0.003 mgm. spleen pulp of a rat dying of plague within 4 days of injection. This dose, administered subcutaneously, killed about 94 per cent. of the control test animals within 15 days—the period used for estimation of percentage survival. Whether 7 days or 14 days were allowed for the development of immunity between prophylactic injection and infection did not seem to affect the result. These results were: Haffkine's prophylactic and Lustig's nucleoprotein produced about an equal degree of immunity (around 35 per cent.) and both of them a higher immunity than agar-grown vaccines.

W. F. Harvey.

BATCHELDER (A.). **Preparation of Specific Serums and Technic of Agglutination Test with *Pasteurella pestis* detoxified with Formaldehyde.**—*Jl. Infect. Dis.* 1929. May. Vol. 44. No. 5. pp. 403–407. With 3 charts. [6 refs.] [George Williams Hooper Foundation for Med. Research, Univ. of California, San Francisco.]

It has always been difficult to obtain smooth and stable suspensions of *Past. pestis* for agglutination purposes. Suspensions when obtained are liable to disintegrate and autolyse: this autolysis is enhanced by heat and is not prevented by the use of phenol. Immunization of rabbits for the production of high-titre sera is also difficult, as they lose weight and are apt to die or develop a motor paralysis. Formalin suspensions of 25 to 35 billion organisms per cc. get over these difficulties. They are prepared with 0.85 per cent. sod. chloride containing 0.25 per cent. formalin. The organisms are killed in 7 to 8 hours. Sera of titre 1 : 1280 to 1 : 2560, which were highly specific and gave flocculent precipitates, could be easily and rapidly obtained by 3 intravenous inoculations given every other day. The animal was bled 10 to 14 days after the last injection.

W. F. Harvey.

FLU (P. C.). Immunisierung von Ratten gegen Pest mit Hilfe von Extrakten aus virulenten Pestbakterien. (Der Bakteriophag als Lösungsmittel.) [**Immunization of Rats against Plague with Extracts of Virulent Plague Bacilli, using Bacteriophage as Solvent.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Aug. 21. Vol. 113. No. 5/6. pp. 473–480. [3 refs.] [Inst. for Trop. Diseases & Trop. Hyg., Leyden.]

Some of the experiments described and the preparation of the vaccine have already been noticed (see this *Bulletin*, Vol. 26, p. 638). The vaccine is safe, sterile and produces no local reaction in animals. Its immunizing action cannot be ascribed to its content in bacteriophage, for this is killed or rendered inactive by the phenol present.

W. F. Harvey.

DE SMIDT (F. P. G.). **Laboratory Notes on Plague in Kenya.**—*Jl. Hygiene.* 1929. July. Vol. 29. No. 2. pp. 201–218. [14 refs.] [Med. Research Lab., Nairobi.]

In "stalactite" cultures the upper part of the growth consists of healthy bacilli in chains, while in the lower part of the growth, where the conditions are more or less anaerobic, the organisms show remarkable involution forms before autolysis. The broth medium used consists of a 20 per cent. 48-hr. autodigest at 37° C. of bullock's pancreas in water, with 1 per cent. peptone, 0.5 per cent. salt and pH 7.0. New strains, obtained from rats and from human subjects, are used for the preparation of vaccine as soon as possible after isolation and test, although experiment showed that the strains need not necessarily be extremely recent. Standardization of vaccine is effected by opacity test of suspended solid and estimation of protein content in solution. Dosage of vaccine and optimum immunity attained receive special attention: 0.3 cc. of Nairobi vaccine is reckoned as the correct

immunizing dose for rats and 3.0 cc. of Bombay vaccine as the correct human dose. It is a mistake to regard the broth of vaccine as the element giving rise to the local and general toxic effects of plague vaccine. These are due to the plague endotoxin, derived from the disintegration of large numbers of bacilli during the long incubation. Serological tests were carried out with local and other strains of *Past. pestis*. The serum used was prepared by injection of rabbits with an old attenuated living strain. Rough colonies of this strain were agglutinated at 1 in 2,500 to 1 in 12,000 and smooth colonies at 1 in 12,000 to 1 in 25,000. The agglutination tests and absorption tests carried out with the serum failed to show any specific variant, out of 71 cultures tested, from the type strain used to provide the serum. No agglutination was obtained with this serum and the organisms of the "haemorrhagic septicaemia" group, *Past. aviseptica*, *suiseptica*, *bovisseptica*, and *muriseptica*.

W. F. Harvey.

SCHÜTZE (H.) & HASSANEIN (M. A.). **The Oxygen Requirements of *B. pestis* and *Pasteurella* Strains.**—*Brit. Jl. Experim. Path.* 1929. June. Vol. 10. No. 3. pp. 204-209. [6 refs.] [Lister Inst., London.]

The authors found that suspensions of *Past. pestis* and other pasteurella organisms, which grew quite satisfactorily on planting out, failed to do so when diluted. This failure to grow, when the organisms were lying isolated on nutrient agar plates, has been traced to oxygen sensitivity. Shake cultures result in growth when surface cultures do not. Reducing agents such as sodium sulphite and anaerobic conditions facilitate growth. A specially interesting point in the investigation was the discovery that the addition to the nutrient agar of small quantities of broth culture of *Past. pestis*, sterilized at 60° C. for 1 hour, supplied isolated microbes with the stimulus to growth. This effect was obtainable with many kinds of bacteria besides *Past. pestis*, but not with all. If, however, the augmentor culture were heated to temperatures higher than 70° C., it lost its power of initiating growth, and this loss of power took place even in the absence of oxygen, thus suggesting that not only does the substance here concerned act as a reducing agent, but that it is enzymic in nature. Smooth variants of pasteurella organisms may be more sensitive to lowered oxygen tension than rough variants.

W. F. Harvey.

OTAKA (Yoshio). **[Influence of *Bacillus pestis* on Hydrogen Ion Concentration of Culture Medium and its Carbohydrate Splitting Action.]**—*Byorigaku Kiyo (Arch. of Path.)*. 1928. Dec. Vol. 4. No. 2. [Summarized in *Japan. Med. World.* 1929. Feb. 15. Vol. 9. No. 2. pp. 54-55.]

Otaka finds that the hydrogen ion concentration of the medium is increased when *Past. pestis* is grown in meat juice and is diminished when grown in peptone water. These are opposite reactions, and when the organism is grown in ordinary bouillon, the resultant reaction

represents the balance between the two. The author therefore believes that it is not advisable to use bouillon or peptone water for the study of the carbohydrate reactions of *Past. pestis* and indeed of any bacterium. One should use media which do not show changes of pH with growth of the test organism. He has found that *Past. pestis* ferments galactose, maltose, dextrin, mannite, laevulose, xylose and dulcitol but does not ferment saccharose, lactose nor inulin.

W. F. Harvey.

CONNAL (Andrew), PAISLEY (J. C.), ELMES (B. G. T.) & BOWREY (R.).
The Post-Mortem Signs of Rat Plague in Lagos, Nigeria.—*West African Med. Jl.* Lagos. 1929. Apr. Vol. 2. No. 4. pp. 176–179. [2 refs.] [Med. Research Inst., Lagos.]

The findings of the Plague Commission in India (*Jl. of Hygiene*, 1907) are supported by the results obtained in Lagos as regards the signs of rat plague. The plague rat shows a bubo, single or bilateral, in the neck, axilla or groin, etc. In a small number of cases (446 out of 2,224) there was no bubo. There is general subcutaneous congestion, a mottled or speckled liver and enlarged spleen; pulmonary congestion with pleural effusion, clear or blood stained. In Lagos there may be, in addition, mesenteric buboes and intestinal haemorrhage. Final diagnosis must be based on the demonstration of *Past. pestis* in stained smears, or by culture or by animal inoculation [this *Bulletin*, Vol. 25, p. 672 (Connal & Paisley)].

J. H. T. W.

MARRAS (F. M.). Osservazioni ed esperienze sulla peste nelle Indie inglesi.
[Plague Observations and Experiments in British India.]—*Ann. di Med. Nav. e Colon.* 1929. May–June. Year 35. Vol. 1. No. 5/6. pp. 301–335. With 7 plates (2 coloured). [23 refs.]

Dr. Marras, of the Egyptian Sanitary Service, has in this paper compiled statistical records of experiments on rodents in the Haffkine Institute in Bombay. The paper is full of statistics, but does not reveal any new facts. Part II is devoted to an ordinary description of human plague.

J. H. T. W.

TAKAHASHI (K.), CHUAN (Li Te), To (Yuan Chen), TSUCHIYA (K.) & ABIKO (A.). [Kleinere Beiträge zur pathologisch-anatomischen Veränderung der Drüsenpest bei Menschen aus 1928 jähriger Epidemie zu Chien-Chia-Tein in Mongolia, China.] **[Pathology of Bubonic Plague.]**—*Jl. Oriental Med.* 1929. July. Vol. 11. No. 1. [In Japanese. Germany summary p. 23.] [Hyg. Inst. of S. Manchuria Rly. Co., Dairen.]

The author describes the bacteria and the pathological conditions seen in 7 cases of bubonic plague. Pieces of liver, spleen, kidney, heart and lymphatic glands were examined. The results contain nothing new. [See this *Bulletin* Vol. 22, pp. 374–375 (FUJINAMI, KULESHA).]

J. H. T. W.

ANNALES DE MÉDECINE ET DE PHARMACIE COLONIALES. 1929. Jan.—Feb.—Mar. Vol. 27. No. 1. pp. 102–121.—Bibliographie des travaux récents concernant la peste. [**Bibliography of Recent Work on Plague.**]

This is a classified Bibliography of the recent literature of plague. It will be very useful for reference. Many of the papers therein mentioned have been noticed in this *Bulletin*.

J. H. T. W.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1929. Apr. Vol. 21. No. 4. pp. 580–586. [2 refs.]—Sur la peste dans l'Inde Britannique [Notes communiquées par le Colonel J. D. GRAHAM]. 1. Résultats des recherches sur la peste poursuivies dans les Provinces-Unies [Dr. GOYLE]. 2. Etude sur les puces du rat dans la zone du Port de Rangoon [Major BILDERBECK]. 3. Notes épidémiologiques sur la peste en Birmanie [Lt.-Col. E. BISSET].

COLOMBANI. Une épidémie de peste bubonique dans le Sous (territoire d'Agadir).—*Bull. Office Internat. d' Hyg. Publique*. 1929 July. Vol. 21. No. 7. pp. 1136–1140.

CORREIA (Alberto Carlos Germano da Silva). La peste dans l'Inde Portugaise.—*Arquivos da Escola Med.-Cirurg. de Nova Goa*. 1929. Ser. A. No. 4. pp. 517–538. With 2 plates.

LEFROU (G.). Contribution à l'étude de la peste au Cayor en 1928.—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 506–520. With 1 map in text. [2 refs.]

SOREL & ARMSTRONG. La lutte préventive contre la peste dans la circonscription de Dakar et dépendances durant l'année 1928.—*Bull. Office Internat. d' Hyg. Publique*. 1929. Apr. Vol. 21. No. 4. pp. 612–618.

THIROUX. La peste à Madagascar, de juillet 1923 à juillet 1928.—*Bull. Office Internat. d' Hyg. Publique*. 1929. Apr. Vol. 21. No. 4. pp. 601–611. With 2 diagrams. [2 refs.]

CHOLERA.

LASNET. Le choléra en 1927 en Indochine. [**Cholera in Indo-China 1927.**].—*Bull. Office Internat. d' Hyg. Publique.* 1929. May. Vol. 21. No. 5. pp. 771-774. With 2 figs.

Cholera, prevalent in 1926, continued into 1927 with an increase in the number of cases especially among the poorer classes and during the dry season when the water levels were low. In the various districts of Indo-China 32,225 cases occurred with 25,170 deaths. Of these no less than 23,054 cases are reported from Tonkin with 18,343 deaths. The sanitary services carried out a large number of anti-cholera vaccinations and 20,427,000 cc. of vaccine were issued by the Pasteur Institute at Saigon. During the first three months of 1928 the figures still remained high, but in August there was a marked diminution in the number of cases.

J. H. Tull Walsh.

JOURDRAN (E.). La campagne anticholérique au Tonkin ; épidémies de 1926-1927. [**The Anticholera Campaign in Tonkin, 1926-1927.**]—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 170-183. With 5 graphs.

The deltaic region of Tonkin, like that of Bengal, is a well known focus of cholera. Among the factors to which the epidemic of 1926-27 is ascribed, are the inundations of 1926 with subsequent famine. In the town of Haiphong the bursting of the drinking water channels and the mingling of that water with flood water was followed 6 days later by a marked rise in the mortality curve. A description is given of the efforts made to meet the epidemic conditions by means of general anticholera vaccine and general sanitary measures.

W. F. Harvey.

KIRIBAYASHI (S.). **On the History of Cholera Epidemics in Formosa since 1895.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 157-169.

The problems of endemic and epidemic cholera as they affect India are essentially the same for many other or most other eastern countries. In Formosa "it may be readily supposed that there has always been cholera epidemic due to the marine communication to China." In this island epidemic prevalence is shown every 7 or 10 years. Such epidemics are regarded as due to spread from the China coast where the prevalence of the disease goes in parallel with that in Formosa. Some of the other factors required for epidemic prevalence, such as exist especially in a primitive population, are referred to.

W. F. Harvey.

IIMURA (Iasuzo). O cholera em relação á imigração japonesa. [**Cholera in Relation to Japanese Immigration.**].—*Folha Med.* 1929. June 5. Vol. 10. No. 16. pp. 184-185.

The author belongs to the Ministry of Sanitation in Tokio and shows how cholera may be taken by immigrants into Brazil from Asia. He

refers to the Articles of the Universal Sanitary Conference of 1926 in which rules are laid down for the examination of passengers embarking or disembarking at the various ports. There does not seem to be much danger of serious epidemics occurring on Japanese ships and in the case of the "Hawaii Maru" he points out that cholera was prevalent in Singapore where the ship called [this *Bulletin*, Vol. 26, p. 85 (TULL)].

J. H. T. W.

CORREIA (Alberto Carlos Germano da Silva). Le choléra aux Indes Portugaises. (Epidémiologie, climatologie sanitaire et prophylaxie.) [**Cholera in Portuguese India.**—*Arquivos da Escola Méd. Cirurg. de Nova Goa*. 1929. Ser. A. No. 4. pp. 425–460.]

This paper which was presented to the International Congress of Tropical Medicine at Cairo contains a history of cholera in Goa and other parts of Portuguese India. Epidemics from old records are noted from 1553 and onward, every few years, to 1927. The effect of pilgrimages, famines, etc., is described, and a long list of places in India to which pilgrims resort is given. The relation of climate to epidemics is considered and the author says that the great cholera epidemics have occurred in years with very intense monsoon rainfall.

J. H. T. W.

RUSSELL (A. J. H.). **Statistical Studies in the Epidemiology of Cholera.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927*. Vol. 2. pp. 131–156. [26 refs.]

The author has published much valuable material on the subject of the statistical investigation of cholera epidemics and indeed on epidemiology in general. He refuses to accept generalizations that are based upon data which have not been subject to modern statistical analysis. In India records of cholera exist from 1866 onwards. Although these refer almost entirely to the more violent outbursts of the disease and their registration has been defective, percentage errors are not so great as to nullify statistical investigation. Thus it has been found possible to forecast epidemics of cholera 2 or 3 months ahead of an outbreak. The provinces of India are divisible into endemic and epidemic cholera areas, a most important distinction. Climatic conditions in their bearing on cholera incidence have been studied carefully by the method of partial correlation for individual factors. Multiple coefficients, which give a single quantitative value to the component factors making up a climatic influence, have been calculated. The tentative conclusions reached are very interesting. Epidemic outbursts are mere intensifications of the endemic disease. Favouring climatic factors, which precede such outbursts, are the association of high relative humidity with high temperature accompanied by intermittent rains. Other conditions than these, however, probably play their part and acknowledgment is made of the rôle of the chronic carrier in this epidemiological complex. The conditions at fairs and festivals may stimulate to activity the latent infection in these persons.

Anticholera vaccination, while admitted to have its effect, is not regarded as a practical measure for the annual recurring protection of millions of pilgrims. The paper ends with the insistence on the need to create a public sanitary opinion in India before all the influences at work in the propagation of cholera will come under control.

W. F. Harvey.

RUSSELL (A. J. H.) & SUNDARARAJAN (E. R.). **The Epidemiology of Cholera in India.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1928. Oct. Memoir No. 12. 204 pp. With 35 graphs & 1 map. [66 refs.] [Summary appears also in *Bulletin of Hygiene*.]

The first four parts of this monograph have been noticed in the *Bulletin of Hygiene* [1927, Vol. 2, p. 45; 1928, Vol. 3, p. 357]. The 5th part is a thorough arithmetical study of the intercorrelations of the five variables, monthly deviations of cholera mortality from a moving average, monthly rainfall, mean humidity, mean temperature and mean barometric pressure in the 13 districts of India selected for study.

All the coefficients of correlation between the measure of cholera incidence and the other variables to the highest possible order, viz., the 3rd, are tabulated and also the multiple correlation of cholera incidence with the other four variables. The inter-relations of the meteorological variables are also fully examined. The most important practical conclusion drawn is perhaps the following.

"This investigation has shown that it is no longer theory to suppose that climatic factors have a definite relationship with the incidence of cholera in India. The association of high relative humidity with high temperature, accompanied by intermittent rains, forms the most favourable atmosphere for development of the disease. The presence of endemic centres from which epidemics spring at short intervals is also a fact which must be accepted. No single factor, however, can be held responsible for the periodic waves of the disease which devastate the provinces of India, and it must be recognized that these waves are preceded by conditions too complex to admit of complete solution with the help of available data. Individual susceptibility, foci of infection, favourable atmospheric conditions, fairs and festivals, carriers, insanitary habits, all play their part in a manner which defies analysis."

[This monograph is a record of by far the most complete epidemiological-statistical study of cholera which has ever been made. Only those who have themselves done work of this kind can properly appreciate the labour it has entailed. The work must be studied by all who intend to work on the subject. When so much has been given it may seem ungrateful to ask for more, but a useful supplement would be a series of comparisons of the actually observed deviations of cholera mortality from the trend with those required by the several multiple regression equations. In other words, it would be interesting to see how nearly a knowledge of the "independent" meteorological variables enables one to estimate the "dependent" variable when the relation is taken to be expressible by an equation of the first degree.]

M. Greenwood.

DUNN (C. L.) & KHAN (Saranjam). **Cholera in Hardwar.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 184–207. With 5 charts & 4 maps. [3 refs.]

[The stigma attached to the term “endemic” focus of cholera whether applied to the region of the Don in Russia, to certain provinces in India, to French Indo-China, or to the Japanese possession of Formosa, is one which is not appreciated locally.]

The first Sanitary Commissioner of the United Provinces in India wrote in 1879 that: “Of all the cholera disseminating centres of India Hardwar is the most important . . . The majority of the pilgrims going to Hardwar come from the Punjab and when this, as it were, buffer state is itself invaded the disease is more likely to attack Persia, Afghanistan, Russia and finally Europe and America. We know that many of the pandemics of Europe have emanated from the pilgrim centre of Hardwar.” The authors of the present article contend from their data that while Hardwar may as a famous pilgrim centre, be on occasion a locality from which epidemic spread may take place, the town has really in the first instance been itself infected with cholera from outside. “Hardwar is not an endemic focus of cholera.” Importation is responsible for the cholera prevailing in the town, as is shown for example (Table) by comparison of the deaths from cholera in Hardwar Union Municipality and the rural area of Hardwar. The latter, in strong contrast to the former, is seen to be “almost entirely free from cholera for the whole period of 56 years available.” As practical preventive measures against pilgrim cholera for Hardwar the authors advise: (1) Immediate introduction of an efficient underground water-carriage system of sewage disposal; (2) the extension of the existing municipal water supply; (3) the chlorination of the bathing pool; (4) anti-cholera inoculation.

W. F. Harvey.

TOMB (J. Walker) & MAITRA (G. C.). **Some Observations on the Bacteriology and Epidemiology of Cholera.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 208–216. With 1 chart in text. [10 refs.]

The use of the “open-bowl” method of cultivation of vibrios has, it is contended, enabled the authors to conclude that agglutinating cholera vibrios in cholera stools added to village tanks are permanently changed *en masse* into the non-agglutinating form after 24 to 36 hours (see this *Bulletin*, 1927, p. 460). By means of the method also they have been able to show that as many as 33 per cent. of the inhabitants of a mining settlement in India are chronic carriers of non-agglutinating vibrios. Sporadic cholera is identical with epidemic cholera, with these important differences that the associated vibrios in the former case are at most feebly infectious and are non-agglutinating. Attempts at conversion of the non-agglutinating vibrio into the agglutinating, although showing that the two were closely allied serologically, gave inconclusive and inconstant results. The results were more favourable for the reverse process as in the above-mentioned tank experiment. Extended examination of the stools of epidemic cholera convalescents have showed that 80 per cent. become chronic carriers of non-agglutinating vibrios. An equally extended examination of the

stools of healthy persons and survivors of epidemic cholera has not furnished a single permanent carrier of agglutinating vibrios. The conclusion of the authors, already noticed in this *Bulletin* is

"That the non-agglutinating vibrio (which is itself capable of causing clinical cholera) takes on the agglutinating characteristic under certain biochemical-physical conditions in the human intestine the nature of which are at present unknown, and in this mutation or epidemic form is the cause of epidemic cholera, since it is not unreasonable to assume that a characteristic so unstable may as easily be acquired as lost. Non-agglutinating intestinal vibrios, therefore, in our opinion constitute the reservoir of cholera both epidemic and endemic. . . ."

W. F. Harvey.

GUPTA (J. Das). **A Note on Cholera in Infants.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 489–491. With 4 charts in text.

The author states that, although cholera is seldom seen in infants, he had, during the last epidemic in Calcutta, a number of cases in the fourth week in May and the first week in June at the "Babies Home," Calcutta. The first two cases were difficult to diagnose and were not at once recognized as cholera (they are described in detail). When the third case arrived a sample of the stool was cultured and found to contain vibrios and agglutination tests were positive. Of four other cases three gave the same results. It was not possible to find the source of infection, but when the nursing staff was changed and all the babies were inoculated with anti-cholera vaccine the epidemic stopped.

J. H. T. W.

PEREIRA (J. M.). **A District Scheme for Cholera Control.**—*Indian Med Gaz.* 1929. Aug. Vol. 64. No. 8. pp. 455–456.

This scheme was started five years ago as an experiment and being found successful was adopted with Government sanction as a permanent measure in the Santal Parganas. The staff necessary to carry out the scheme consists largely of personnel already in District Board employment, the outlying rural dispensaries, the sub-divisional headquarters dispensaries and the district headquarters hospital which forms the "base and reserves." The district is divided into areas of control and each is equipped with a "Cholera unit box." The medical officer, dresser and staff are already there and a radius of five miles is allotted to this unit. The occasional absence of the medical officer is compensated by the value of his services in preventing and treating cholera in the outlying areas. The equipment is described in detail. The unit, apart from medicines and disinfectants, contains one hundred doses of anti-cholera vaccine. As a further line of defence there is a "flying column" which may be sent anywhere at any time. The full equipment carried by this column is given in the paper. It includes a transfusion flask with cannula and tube and is altogether satisfactory. With 21 centres in the first and second line and a liberal base supply the initial expenditure with staff amounted to Rs. 5,000 and the recurring charges are about Rs. 2,000 annually.

J. H. T. W.

- i. KHAN (Saranjam). **On the 'Carrier' Problem of Cholera.**—*Indian J. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 147–163. [29 refs.]
- ii. —. **On the Reservoir of Epidemic Cholera.**—*Ibid.* pp. 164–169.

i. The author is opposed to the general belief that there are chronic carriers of cholera as in the case of enteric fevers. In his paper he points out that there is no chronic infection of the gall bladder by *V. cholerae*. The majority of cholera cases get free of the vibrio within a few days. The author's results at Hardwar showed that 95 per cent. of all cases and contacts of cholera are free from vibrios within 14 days, the remainder within one and a half months and it is doubtful if these latter are infectious at the end of $1\frac{1}{2}$ months since the small number passed would hardly cause fresh cases of cholera. No outbreak due to such a source has been recorded.

ii. The reservoir of cholera is not "chronic carriers" of *V. cholerae* nor is it the carriers of the inagglutinable vibrio. The real reservoir is in endemic areas and in patients suffering or recovering from cholera. The only sources of infection are patients in the acute stage for about 4 days, also some, to a lesser extent, in the convalescing stage for about 14 days; and perhaps a few in the incubation period.

J. H. T. W.

- RUSSELL (A. J. H.). **Besredka's Cholera Bilivaccin versus Anti-Cholera Vaccine: a Comparative Field Test.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 523–530. [12 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Tests were carried out in an Indian area definitely proved to be an endemic centre of cholera. The vaccines were administered in 360 villages having a total population of about 650,000. Anti-cholera vaccine alone was given in 236, and bilivaccine alone in 52 villages. In the remaining 72 villages, the two vaccines were used side by side, about one third of the population being given inoculations, one-third treated with bilivaccine and the remaining third taken as controls. The work covered three epidemics and lasted 18 months.

It was found that the attack and case mortality rates among the unprotected were 5.6 and 1.9 times as high as among those given the full course of bilivaccine. With anti-cholera vaccine, among direct contacts, unprotected individuals showed attack and case fatality rates 5.6 and 5.8 times as high as those inoculated twice. Much the same degree of protection from attack is, therefore, given by the full dose of bilivaccine and the double inoculation with anti-cholera vaccine; but the case mortality is appreciably lower among those given inoculations.

Further analysis shows that immunity does not definitely exist until 3 days after inoculation, and that two inoculations confer a definitely higher degree of protection than one inoculation. About 2–3 days are necessary for the development of maximum immunity after full treatment with bilivaccine.

A useful discussion is appended.

P. L. McKinlay.

TOMB (J. Walker). **A Note on the Value of Medicinal Treatment in Cholera.**—*Indian Med. Gaz.* 1929. May. Vol. 64. No. 5. pp. 246-247.

This paper refers to the treatment of 723 cases of cholera in the Asansol Mining Settlement and the essential matter is given in three "tables":—

TABLE III.

Analysis of the results of treatment of cholera cases by various methods in the Asansol Mining Settlement during the years 1922 to 1928.

Treatment.	1922.		1923.		1924.		1925.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
"Cholera Mixtures"	268	128	131	78	236	152	86	36
Saline Injections	25	11	29	10	47	33	27	13
Homeopathy ...	15	3	56	31	67	32	27	11
Essential Oils' Mixture ...	—	—	78	16	111	28	33	13
Total number of treated cases ...	—	—	—	—	—	—	—	—
Untreated ...	39	26	50	48	74	72	21	18

Treatment.	1926.		1927.		1928.		Total		Percentage case mortality.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
"Cholera Mixtures"	624	347	177	68	331	172	1,853	981	52.9
Saline Injections	86	37	14	5	48	21	276	130	47.1
Homeopathy ...	136	69	47	16	21	11	369	173	47.0
Essential Oils' Mixture ...	21	6	24	5	61	19	328	87	26.5
Total number of treated cases ...	—	—	—	—	—	—	2,826	1,371	48.5
Untreated ...	112	105	26	26	76	69	398	362	91.0

J. H. T. W.

ANDU (A. B.) & VAN NIEKERK (J.). **Choleratoxine.** [**Cholera Toxins.**]—*Acta Leidensia (Scholae Med. Tropicae)*. 1928. Vol. 3. pp. 203-251. With 3 figs. on 2 plates. [4 pages of refs.] Also in *Zent. f. Bakt.* I. Abt. Orig. 1929. June 28. Vol. 112. No. 6/8. pp. 519-547. With 3 text figs. [Numerous refs.] [Inst. for Trop. Med., & Pharmaco-Therap. Inst., Reichs Univ., Leyden.]

The research of the authors is mainly concerned with the comparison of the action of two vibrio strains, one Calcutta 30 of HAHN and HIRSCH,

the other a true cholera strain 169 of the Leyden Institute. They find that the most suitable medium for growth is a 0.1 per cent. glucose bouillon whose pH can be kept constant, even with 3 days culture, at pH 7.6-8 by the addition of 10 per cent. phosphate buffer solution of pH 8 and 2 per cent. calc. carbonate (chalk). Turbidity of the culture was already apparent after 2 hours incubation. The two cultures corresponded closely in their morphological and cultural characters but the serological reactions show that Calcutta 30 could not be regarded as a cholera vibrio. The toxin of the former, however, could immunize a guineapig against a 10-fold lethal dose of the living culture of strain 169. Tests were carried out with this toxin on the heart and intestine of a rabbit. It paralysed the heart. Small doses stimulated contraction of the intestine while large doses paralysed.

W. F. Harvey.

HAHN (Martin) & HIRSCH (Julius). Studien ueber das Choleragift. [**Studies on Cholera Toxin.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1929. July 24. Vol. 110. No. 2. pp. 355-381. With 6 text figs. [15 refs.] [Hyg. Inst., Univ., Berlin.]

Development of knowledge of ferment action has done away with the distinction between ferment and enzyme. So also may further knowledge of bacterial toxins result in abandonment of the present differentiation of ecto- from endo-toxin. A continuous cultivation procedure without exhaustion of medium is described for cholera which is dependent on fractional addition of sugar and maintenance of alkaline reaction. Cholera toxin acts upon guineapigs by producing primarily an acute condition with fall of temperature followed by a quiescent stage and death from secondary lesions. The labile cholera toxin can be preserved as an active dry preparation and can be purified by dialysis. An active antiserum is obtainable by immunization of the goat and the horse. Toxin production is exhibited especially by those strains, still regarded as true cholera, which are haemolytic on sheep blood-agar plates. That there is a close relation between haemolytic potency and toxic action receives confirmation from the fact that the same serum quantities are required to neutralize the minimum lethal dose and the haemolytic action of that dose.

W. F. Harvey.

VAN RIEMSDIJK (M.). Der Einfluss des Sauerstoffs auf die Beweglichkeit und Form der Choleravibrionen. Der "Dauer"-hängende Tropfen. Dem Andenken meines unvergesslichen Meisters, Professor Dr. R. H. Saltet, gewidmet. [**Influence of Oxygen on the Motility and Form of Cholera Vibrios. Long Continued Observation in Hanging Drop.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. July 30. Vol. 113. No. 3/4. pp. 161-189. With 3 text figs. [2 refs.]

Oxygen has a decided influence on the motility of cholera vibrios. Those vibrios obtained from underneath the pellicle are much more sensitive to stimuli than those of the pellicle itself. From being sluggishly motile they become autoagglutinated and exhibit strange involution forms. Later still they develop active motility. The cycle ends with loss of motility and the appearance of the smallest round vibrio forms. Many of the involution forms are phantastic and may

be of great length. The vibrios from the pellicle, in contrast to this picture, become less motile, shorter, plumper and finally small vesicles. [See also this *Bulletin*, Vol. 26, 1929, p. 87.]

W. F. Harvey.

BRAHMACHARI (B. B.). Non-Agglutinating Vibrios, their Relation to the Typical *Vibrio cholerae*.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927*. Vol. 2. pp. 225–234. With 1 chart in text. [5 refs.]

An examination during 12 months of 2,490 healthy persons and 496 surface tanks furnished 1·2 per cent. agglutinating and 12·6 non-agglutinating vibrios in the former case, 1·8 per cent. agglutinating and 34·9 per cent. non-agglutinating in the latter case. No agglutinating vibrios were isolated from July to October, that is, during the season of freedom from the disease. The characters of 68 of the non-agglutinating vibrios were investigated serologically and it was found that for over six months none of these agglutinated with standard cholera antiserum. After that interval of time, however, a change began to take place in some of the strains. As many as 58 per cent. developed response to anticholera serum, two to the extreme titre of 1/8000 and 1/16000 respectively. One strain, on cultivation in its own homologous serum, came to agglutinate with standard cholera serum only, at the titre limit of 1/8000. Three strains produced, in rabbits under immunization to them, sera which also agglutinated the typical cholera vibrio. It is contended, therefore, that over 58 per cent. of the non-agglutinating vibrios specially investigated have been transformed into agglutinating vibrios and are, in fact, nothing else than true cholera vibrios.

W. F. Harvey.

UKIL (A. C.). The Action of Cholera Convalescent Serum on Comma Vibrios.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927*. Vol. 2. pp. 222–224. [1 ref.]

Thirty sera of cholera convalescents were tested for agglutinating and bacteriolytic potency. The distribution of the agglutination titres was: 10 with 1/1000, 9 with 1/500, 6 with 1/100 and 5 with nil or doubtful titre values. Bacteriolytic titres followed the agglutination titres closely. The results were that, 18 sera produced complete lysis, 7 a partial lysis (few colonies on plates) and 5 were of very slight potency.

W. F. Harvey.

STUTZER (M.). Ueber choleraähnliche Vibrionen. [Cholera-like Vibrios.]—*Zent. f. Bakt. I. Abt. Orig.* 1929. July 8. Vol. 113. No. 1/2. pp. 28–35. [9 refs.] [State Microbiol. Inst., Rostow a. D.]

The views which would identify water vibrios and fish vibrios with the cholera vibrio are well known. If they held good, then Rostov on the Don would have to be regarded as a locality in which cholera was endemic. The present research is not directly concerned with the general question so much as with the study of 14 vibrio cultures isolated from hospital patients of this district who suffered acutely in

1927 from gastrointestinal disturbance. The organisms in question were found to belong to two species, (1) *Vibrio paracholerae* (s. *phosphorescens*) and *Vibrio alcaligenes*. The former of these is closely allied to *V. cholerae* in its morphology, its fermentation of carbohydrates and its cultural characters, while both organisms differ markedly from it serologically. Agglutination tests with sera of the Don river vibrios showed them to be identical with the vibrios isolated from the stools of the patients. The dates of appearance of vibrios in the river water and their correspondence with the onset of symptoms in the patients are important. Of the 14 cultures, 3 were isolated in June, 6 in August and 5 in September. It was on the 28th May that paracholera water vibrios began to appear in the Don. By June 20th every water examination demonstrated their presence; they rapidly began to disappear from October 1st and could no longer be found by October 19th. These Don water vibrios were also to be found in the Sea of Azov. No support is given to the idea that the paracholera vibrio is only a variant of the true cholera vibrio.

W. F. Harvey.

BASSINA (S.). [Biologie der Wasservibrien des Donflusses.] [**Biology of Water Vibrios of the River Don.**].—*Berichte des Mikrobiologischen Staats-Instituts z. Rostow am Don*. 1929. Feb. No. 6. pp. 5-46. [2 pages of refs.] [In Russian. German summary pp. 48-49 With 4 figs. on 2 plates.]

Morphologically the acid-forming vibrios, both phosphorescent and non-phosphorescent, and the alkali-forming vibrios are identical. Those of the acid-forming group are closely related culturally to the cholera vibrio, but the alkali-forming vibrios are quite distinct. Not one of the Don river paracholera vibrios was agglutinated by cholera serum nor was an acid-forming vibrio agglutinated by the serum of an alkali-forming vibrio. Pathogenic properties were tested on guineapigs. None of the acid-forming vibrios were pathogenic in doses of 0.1 cc. of a 24-hr. bouillon culture. In the investigation of the phenomenon of dissociation three variant types of colony were separated—transparent, wrinkled and of dull surface.

W. F. Harvey.

KHAN (Saranjam) & AGARWAL (Mahendra Nath). **On the Duration of the Life of Vibrios in the Ganges and Jumna River Water.**—*Indian J. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 993-1008. [4 refs.]

These two rivers possess high sanctity for Hindus and the religious gatherings which take place upon their banks and especially at their junction are generally considered to be important centres for the spread of cholera. Not only is actual bathing in these waters an important religious ceremony, but the water is taken away by pilgrims to their distant homes. Two organisms were used by the authors in test, one an inagglutinable vibrio with the morphological and cultural characters of the cholera vibrio and the other an agglutinable cholera vibrio. The inagglutinable vibrios survived in boiled river water for 9 to 11 days and in unboiled water from 3 to 7 days. A significant difference in the duration of life of the vibrios was found for the different unboiled waters. Jumna and well-water from the junction of the rivers was more vibriocidal than Ganges water.

W. F. Harvey.

BISCEGLIE (Vincenzo). Ueber ein filtrierbares Virus, das aus cholera-kranken Tieren gewonnen wurde. Neue Versuchsergebnisse. [A Filterable Virus from Cholera-Infected Animals. New Results.] — *Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Aug. 1. Vol. 62. No. 5/6. pp. 437–446. [11 refs.] [Inst. of General Path., Univ., Bologna, & Inst. of General Path., Univ., Modena.]

Much discussion has centred round the subject of filterable forms of visible organisms. The author has not had the success claimed by others in demonstrating that culturable forms of typhoid or cholera organisms are obtainable from the centrifuged deposit of filtrates through Berkefeld candles nor that such deposit contained any bacillary fragments. The same negative results were obtained with the centrifuged deposit of filtered suspensions of liver, spleen and kidneys of guineapigs dying from intraperitoneal injection of cholera vibrios. What then is the evidence for the existence of an invisible filterable form of the cholera vibrio and what is its nature? These facts may be summarized as follows:—

(1) Fragments of organs of cholera-infected animals, although they showed themselves devoid of visible or culturable organisms, could produce in fresh animals the same picture of disease as the original microbic cultures, stimulate the development of agglutinins and render the animals immune to several lethal doses. Moreover the disease picture was transmissible in series by suspensions of the organs of the dead animals.

(2) Nucleoproteins extracted from the organs of cholera-infected guineapigs and inoculated into fresh guineapigs produced rise of temperature, progressive wasting and the death of the animal.

(3) The nucleoproteins extracted from the organs of the previous animals, failed to produce disease symptoms or to develop any immunity to cholera vibrios. Nor was it possible to transmit the disease in new animals.

(4) It is not possible to define the nature of the filterable virus obtained from cholera vibrios, but in any case the researches here set out seem to exclude the possibility that the virus is bound to nucleoprotein and that it is an organized living thing.

W. F. Harvey.

CHATTERJEE (Jagadish Chandra). Certain Cases with Symptoms simulating Cholera, possibly caused by Round Worm Infection.—*Calcutta Med. Jl.* 1929. Apr. Vol. 23. No. 10. pp. 568–571.

DUNN (C. L.). Sur l'épidémiologie du choléra dans les Provinces-Unies — *Bull. Office Internat. d'Hyg. Publique.* 1929. May. Vol. 21. No. 5. pp. 764–770. [2 refs.]

RUSSELL (A. J. H.) & SUNDARARAJAN (E. R.). The Epidemiology of Cholera in India.—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1928. Oct. Memoir No. 12. 204 pp. With numerous graphs. [66 refs.]

TROPICAL OPHTHALMOLOGY :

A REVIEW OF RECENT ARTICLES.—XII.*

CONJUNCTIVA.—*Phlyctenular Conjunctivitis*.—PILON¹ has discussed LIAN's paper on phlyctenular conjunctivitis (see this *Bulletin*, Vol. 26, p. 504) and forms the opinion that the disease is not a typical phlyctenular conjunctivitis, but is a non-specific condition liable to accompany various inflammations of the conjunctiva.

Trachoma.—MORAX² after studying the statistics for the past twenty-five years of the Lariboisière Hospital, has discussed the question whether there has been any real increase of trachoma in Paris. He has come to the conclusion that any slight increase there may be is due to the influx of infected foreign and colonial labourers which has occurred in response to the demands of industry. TALBOT³ notes with approval the recent order of the Tunis authorities by which trachomatous subjects, drawn for conscription, are no longer exempt from serving. Such conscripts are now to be placed in special units until they are cured. He states that in the past exemption has led to a deliberate spread of the disease owing to the desire to evade military service. The Montana State Department⁴ has investigated the prevalence and the incidence of trachoma among 3,158 school-children in the State; 236 of the children were found to be infected. Extreme care was taken to ensure accuracy in diagnosis. The three experts who composed the board separately examined each child and the diagnosis, when positive, represented their joint opinion. The object of the inquiry was: (1) to determine as accurately as possible the amount of trachoma actually present amongst the white children who were attending schools on and adjacent to the Indian reservation; and (2) to determine the importance of association in school as a factor in the spread of the disease. The investigators concluded that infection mostly occurred in the children's own homes and not at school.

BURNIER⁵ states that trachoma is very common in St. Paulo. Many patients attending hospital for other diseases bear scars of former trachoma. He thinks, however, that much pseudo-trachoma exists. He prefers to classify the term trachoma as "pure" and "complicated" rather than "acute" and "chronic."

PILLAT⁶ believes that trachoma is "a menace to the population of China." The disease is met with to an appalling extent throughout the entire land. It is, however, of a relatively mild nature, being most

* For the eleventh of this series see Vol. 26, pp. 504-510.

¹ PILON (P. J. J. R. T.). Eenige opmerkingen omtrent de conjunctivitis phlyctaenulosa in de tropen.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. June 10. Vol. 69. No. 6. pp. 565-571.

² MORAX (V.). Le nombre des trachomateux a-t-il augmenté à Paris depuis la guerre.—*Rev. Internat. du Trachome*. 1929. Jan. Vol. 6. No. 1. pp. 22-25. With 1 text fig.

³ TALBOT. L'aptitude au service militaire des trachomateux en Tunisie.—*Rev. Internat. du Trachome*. 1929. Jan. Vol. 6. No. 1. pp. 28-30.

⁴ CROUCH (J. H.). A Trachoma Survey of 29 Public Schools on or near Indian Reservations in Montana.—*Public Health Rep.* 1929. Mar. 22. Vol. 44. No. 12. pp. 637-645.

⁵ BURNIER (J. Penido). O trachoma em S. Paulo.—*Brasil-Medico*. 1929. July 20. Vol. 43. No. 29. pp. 828-830.

⁶ PILLAT (A.). About the Trachoma Problem in China.—*China Med. J.* 1929. Feb. Vol. 43. No. 2. pp. 87-103. [10 refs.]

frequently of a follicular type, and spontaneous cures are not uncommon. He favours treatment by copper sulphate, but makes the rather questionable statement that its use may, within limits, be entrusted to laymen without danger. Education regarding the disease must always be an important factor in its eradication.

WORMS and MARMOITON⁷ have reviewed the subject in a lengthy paper. The review represents current French opinion on trachoma, but throws no fresh light on the disease. The authors favour Abadie's method of deep galvano-puncture of the upper fornices.

Fox⁸ believes that trachoma did not exist amongst the Indians until they were brought into close contact with the white population; it is therefore a comparatively recent disease amongst the Red Indians. He favours surgical treatment of the disease: roller forceps or grattage followed by a vigorous scrubbing with perchloride of mercury in the early stages and excision of the tarsal cartilage, often combined with a canthotomy in the later stages.

AFANASSIEVA⁹ entirely disagrees with the views and observations of TRAPESONTZEVA (mentioned in this *Bulletin*, Vol. 25, p. 477) regarding the non-specific nature of the corpuscles of Prowazek. He thinks this author has not been dealing with the true corpuscles. These stain a blue-violet with Giemsa, but Trapesontzeva has described an entirely different product which has a different colour reaction. MORAX¹⁰ has made many histological examinations of tissue obtained from corneae affected by trachoma, and has formed the opinion that the corneal changes are not caused mechanically by the friction of the altered conjunctival lining of the lid, but are due to a development in the cornea of the same infectious agent as caused the conjunctival changes.

AUBARET¹¹ recognizes that it is not always easy to diagnose trachoma from other conjunctival affections which may simulate it. In view of recent bacteriological findings, however, the classical conception of the disease as being of a truly specific nature must not be lightly discarded. He considers that the three signs of the condition, described by MILLET¹² give important aid. These are: (1) a kaleidoscopic distortion of the ophthalmoscopic red reflex which is caused by facets on the corneal surface; (2) an alteration in the vessels seen in the tarsal conjunctiva; these run irregularly and no longer pursue a course parallel to the meibomian glands; (3) the appearance of small, shell-like opacities within the upper border of the limbus. The author adds to these a fourth sign, viz., a swollen, protruding and granular condition of the semilunar fold.

⁷ WORMS (G.) & MARMOITON (J. E.). Le trachome.—*Arch. Méd. et Pharm. Milit.* 1929. Jan. Vol. 90. No. 1. pp. 1-59. [12 refs.]

⁸ FOX (L. Webster). The Indian and the Trachoma Problem.—*Amer. Jl. Ophthalm.* 1929. June. Vol. 12. No. 6. pp. 457-468.

⁹ AFANASSIEVA (H. A.). Interprétations erronées des corpuscules de Prowaczek. (Quelques observations à propos d'un article du Dr. Trapesontzeva (de Moscou), paru dans les *Archives de l'Institut Pasteur de Tunis*, 1927.—*Rev. Internat. du Trachome*. 1929. Apr. Vol. 6. No. 2. pp. 55-64.

¹⁰ MORAX (V.). Complications cornéennes du trachome.—*Rev. Internat. du Trachome*. 1929. Apr. Vol. 6. No. 2. pp. 90-94.

¹¹ AUBARET. Notes sur la séméiologie et l'étiologie du trachome.—*Rev. Prat. Malad. des Pays Chauds*. 1928. Aug. Year 7. Vol. 8. No. 8. pp. 424-431. [3 refs.]

¹² MILLET (A. H.). Trois petits signes du trachome cicatriciel.—*Ann. d'Oculistique*. 1924. Vol. 161. pp. 656-663. With 1 text fig.

MEYERHOF¹³ remarks upon the surprisingly varied characteristics the disease may present in Egypt and describes some of the graver forms met with there. He states that gelatinous degeneration and trachomatous xerosis are less common in Egypt than in colder countries. Excessive cicatrization with its destructive sequelae, however occur very frequently in Egypt. The case described by DELANOË¹⁴ serves to demonstrate the protean nature of the disease. The patient was an Arab woman aged about 20, and her left eye alone was affected. Very abundant, hyperplastic granulations covered the tarsal conjunctiva and spread on to the bulbar portion of the membrane. The cornea was subject to pannus crassus with some ulceration. Even the lachrymal gland was swollen. By contrast the right eye was wholly unaffected and remained so. The usual forms of treatment proved entirely ineffectual. Chaulmoogra oil, however, afforded the most relief. After a month's local treatment intravenous injections of novarsenobenzene were administered. These were followed by an immediate improvement although there was no indication of any syphilitic infection. Within a month the patient was practically well. Unfortunately a relapse took place three months later. It is suggested that this was due to a reinfection from her small son who suffered from the disease. It is interesting to note that injections of novarsenobenzol failed to relieve this second attack of the disease. WILSON¹⁵ when experimenting with trachoma inoculation in monkeys found them liable to contract spontaneously a form of follicular conjunctivitis. This fact indicates that any conclusion based upon the result of animal inoculation must be received with extreme caution. The author pleads for a clear understanding regarding what is and what is not trachoma. Strother SMITH¹⁶ has noted the great prevalence in India of simple chronic conjunctivitis, the probable cause of the disease being constant irritation from dust, smoke, etc., and states that the condition is often confounded with trachoma. He thinks most trachoma cases in India commence during childhood. In diagnosing trachoma he considers that freedom of the bulbar conjunctiva from infection constitutes a strongly positive indication of the disease. He recommends painting the conjunctiva with a solution of silver nitrate 60 grains to the ounce, followed by a douche of electrolytic chlorine solution 1 in 80. The eye is then rested from treatment for about two days. He remarks that the chief point is not to overdo the silver nitrate treatment. [A wise caution to be heeded whenever caustic solutions are applied to the conjunctiva, but specially so when the solution is of such concentration as that recommended by the author.]

CORNEA.—The question of how best to tattoo a leukoma of the cornea has received some attention of late. BANAJI¹⁷ claims satisfactory

¹³ MEYERHOF (Max). Sur quelques formes graves de trachome observées en Egypte.—*Rev. Internat. du Trachome*. 1929. Apr. Vol. 6. No. 2. pp. 69-75.

¹⁴ DELANOË (E.). Trachome unilatéral à allure particulièrement grave. Traitement par l'huile de chaulmoogra et les injections intraveineuses de novarsénobenzol.—*Rev. Internat. du Trachome*. 1929. Jan. Vol. 6. No. 1. pp. 1-6.

¹⁵ WILSON (Rowland P.). Nouvelles notes sur le problème étiopathologique du trachome.—*Rev. Internat. du Trachome*. 1929. Apr. Vol. 6. No. 2. pp. 76-90.

¹⁶ SMITH (F. F. Strother). Trachoma.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927*. Vol. 1. pp. 311-316.

¹⁷ BANAJI (B. P.). Tattooing of the Cornea with Platinum Chloride Solution for Leucoma.—*Indian Med. Gaz.* 1929. Apr. Vol. 64. No. 4. p. 201.

results from the use of platinum chloride solution. According to his technique the surface epithelium of the leukoma is removed by a Graefe knife or a sharp spoon. Platinum chloride in 2 per cent. solution is then applied on a moistened swab to the denuded area for a period of two minutes. Eight to ten drops of a freshly prepared solution of hydracin hydrate (2 per cent.) is then dropped on to the area and allowed to remain for twenty or twenty-five seconds. The eye is then well washed with sterile water.

Keratomalacia.—PILLAT and KING¹⁸ have endeavoured to determine the source of the pigment found in the conjunctiva in cases of keratomalacia. They quote WRIGHT¹⁹ and KIRKPATRICK as implying that this pigment had an hepatic origin. [The reviewer must have expressed himself badly in the paper referred to since he never held such an opinion.] Tests of the liver efficiency conducted on twelve keratomalacia patients showed no marked degree of impaired liver function; and the authors conclude that the pigmentation in such cases is probably not of biliary origin. The tests employed were laevulose tolerance and the quantitative estimation of bilirubin in the blood serum.

UVEA.—DUGGAN²⁰ has obtained excellent results from the use of *milk injections* in the treatment of most of the acute inflammations of the eye. He found the treatment especially beneficial in inflammations of the uvea.

LENS.—**Cataract.**—LAW²¹ has noted vomiting to occur in 17 patients out of 141 operated on for senile cataract at Moorfields Hospital in five months. The majority of the cases occurred in females. Actual prolapse of the iris was found in 2 cases out of 15 in which vomiting occurred—a proportion of 13·3 per cent. It has been the custom of the hospital to ensure that the patient's stomach is empty at the time of operation, and Law suggests that this may be one of the reasons for the undue frequency of the complication. [It certainly does seem unnecessary and undesirable to insist upon the same routine as for an operation in which a general anaesthetic is administered.] The author has included all instances in which vomiting occurred during the patient's stay in hospital. The iris prolapse rate for the 141 patients was 7·1 per cent.—10 cases.

NANHORYA²² has analysed one hundred of his cases of cataract extraction. He employed Smith's method, but modified it by forming a conjunctival flap. Vitreous loss occurred in 10 per cent. of the cases, iris prolapse in 1 per cent., and suppuration in 1 per cent.

Luther PETER²³ details the technique which he now employs. He has adopted various modifications as the result of his experience.

¹⁸ PILLAT (Arnold) & KING (Gordon). An Inquiry into the Origin of the Abnormal Pigmentation of the Skin and Conjunctiva in Cases of Keratomalacia in Adults.—*Brit. Jl. Ophthalm.* 1929. Oct. Vol. 13. No. 10. pp. 506–512. With 1 text fig. [10 refs.]

¹⁹ WRIGHT (Robert E.). Keratomalacia in Southern India.—*Brit. Jl. Ophthalm.* 1922. Apr. Vol. 6. pp. 164–175. [10 refs.]

²⁰ DUGGAN (J. N.). Milk Therapy in Eye Diseases.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 307–310.

²¹ LAW (Frank W.). An Enquiry into the Occurrence and Effects of Vomiting after Cataract Extraction.—*Brit. Jl. Ophthalm.* 1929. July. Vol. 13. No. 7. pp. 358–363.

²² NANHORYA (H. B. D.). Analysis of a Hundred Cases of Cataract Extraction at the Raipur Main Hospital by Smith's Method with a Flap of Conjunctiva.—*Indian Med. Gaz.* 1929. Apr. Vol. 64. No. 4. pp. 193–194. With 2 text figs.

²³ PETER (Luther C.). Important Phases of a Satisfactory Senile Cataract Extraction.—*Amer. Jl. Ophthalm.* 1929. Sept. Vol. 12. No. 9. pp. 727–730. With 2 text figs.

He uses a motor block combined with a deep injection of 1 to 3 cubic centimetres of a 2 per cent. novocain solution into the region of the ciliary ganglion in all cases except in diabetic patients. He inserts a lid suture near the margin after anaesthesia. This is tied and left in for 4 or 5 days after the operation. He substitutes a retractor held by an assistant for a speculum. He uses a large conjunctival flap and unites this by two lateral sutures after the lens is extracted and the toilet completed. He favours extraction in the capsule effected by a smooth capsule forceps aided by a Smith's hook.

SHASTID²⁴ thinks that senile cataract may be due to a pressure of the ciliary muscle upon the hard senile lens. The effort to accommodate in presbyopia leads to pressure of the ciliary processes on the lens capsule; minute traumata of the capsule result and lens degeneration occurs in consequence. In cases of incipient cataract with presbyopia he therefore makes a practice of slightly over-correcting the presbyopia and thus diminishing any tendency to excessive accommodation. For ordinary cases he often prescribes +3.50 D, and states that +3.25 D. is almost always easily borne. He claims remarkably good results for the treatment.

GLAUCOMA.—COPPINGER²⁵ has analysed the statistics of the glaucoma patients dealt with at the Calcutta Eye Infirmary during 1927. The total number was 205; and no fewer than 62 of these could be attributed to *Epidemic Dropsy*. The most intractable cases were those which had suffered from the dropsy on more than one occasion. It was found advisable to remove dropsy patients from the endemic area as soon as possible after operation. Diastolic blood pressure was found to be remarkably high in all classes of glaucoma other than the inflammatory type. The experience of MUKERJEE²⁶ in the same epidemic was very similar. He met with 253 cases, 230 being Hindus. Haloes were complained of by almost all the patients. And, though the disease was seldom of an even moderately congestive type, steaminess of the cornea was a very constant sign. A low calcium content of the blood was a feature of the disease, whilst anaemia and a moderate leucopenia with a high proportion of mononuclears were also common characteristics. Early operation (sclero-corneal trephining) was found advisable when the eye disease failed to respond quickly to medicinal local and constitutional treatment. NEWCOMB and VERDON²⁷ found the intravenous injection of hypertonic sodium chloride solution to be a valuable means of lowering the intra-ocular pressure especially as a preliminary to operation. They are uncertain whether the fall in tension is to be attributed to a change in the osmotic pressure or to an alteration in the constitution of the blood. The average amount injected by them was 20 cc. with a dose of 0.134 gm. of sodium chloride per kilo of body-weight. The injection was preceded and followed by a few cc. of normal saline solution in order to avoid any tissue irritation.

²⁴ SHASTID (Thomas Hall). The Treatment of Incipient Cataract.—*Amer. Jl. Ophthalm.* 1929. Aug. Vol. 12. No. 8. pp. 665-666.

²⁵ COPPINGER (W. V.). Glaucoma as seen at the Calcutta Eye Infirmary 1st November, 1926 to 31st October, 1927.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 267-271.

²⁶ MUKERJEE (S. K.). Glaucoma as a Result of Epidemic Dropsy.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 272-278.

²⁷ NEWCOMB (Clive) & VERDON (Philip). Intra-Ocular Tension.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 279-285. [1 ref.]

The experience of ELLETT and RYCHENER²⁸ does not encourage one to expect to cure chronic glaucoma by using laevo-glauconan. They found its effect to be only a transient one in those cases in which the tension was at all lowered. It was, however, of service in breaking down iris adhesions in uveitis associated with a high tension, and it occasionally brought about a fall in the intraocular pressure in such conditions. Amino-glauconan failed in their hands to reduce the tension in acute glaucoma.

WRIGHT and Koman NAYAR²⁹ have also studied the effect of various forms of non-operative treatment, covering 100 cases of primary glaucoma. They regard aminoglauconan, though inconstant in its action and troublesome to use, as preferable to glauconan. Yet it seemed less effective than the adrenalin pack. Intravenous injections of hypertonic saline solution were only of service as a preliminary to operation in acute, intractable glaucoma. They conclude that the adrenalin pack may be expected to act as a powerful adjunct to ordinary non-operative treatment, but the efficient instillation of eserine is the best single form of medicinal treatment. Nevertheless, they have discovered no combination of non-surgical methods which will obviate an eventual operation. In the majority of cases they prefer trephining to other surgical procedures. When applying adrenalin pack the eye is first anaesthetized by instillations of 2 per cent. holocaine. Half per cent. eserine is next instilled six times during an hour, and then a small, flattened pledget of wool soaked in 1/1,000 adrenalin solution is placed in the upper fornix for five minutes. Six half-hourly instillations of eserine are made subsequently.

CUÉNOD and ROGER-NATAF³⁰ have found glaucoma to be extraordinarily prevalent in Tunis. Climate, race predisposition, astigmatism and syphilis all probably play a part in the causation of the disease. The authors, however, consider that trachoma is one of the main causes. Of 521 glaucomatous patients, 25 per cent. suffered from glaucoma secondary to trachomatous leucomata. 75 per cent. of the glaucoma patients were trachomatous subjects. The authors suggest that cicatricial changes at and around the limbus may explain the increased liability to a rise in intraocular pressure.

GENERAL DISEASES.—*Dysentery*.—BHADURI³¹ reports two cases of relapsing iridocyclitis in the causation of which the *Entamoeba histolytica* seemed to play an important part. Both cleared up and remained free from relapses once emetine treatment had been instituted. The same author also reports a case of corneal ulcer and a case of paralysis of accommodation. These occurred in dysenteric patients and were favourably affected by the use of emetine.

²⁸ ELLETT (E. C.) & RYCHENER (R. O.). Some Clinical Observations on Levo-glauconan (Links-Glauconan and Amin-Glauconan).—*Amer. Jl. Ophthalm.* 1929. May. Vol. 12. No. 5. pp. 368–372. [5 refs.]

²⁹ WRIGHT (R. E.) & NAYAR (K. Koman). The Adrenaline Pack in the Treatment of Glaucoma. Its Value in Temporarily reducing the Intraocular Pressure.—*Brit. Med. Jl.* 1929. Sept. 7. pp. 456–457. With 6 charts.

³⁰ CUÉNOD & ROGER-NATAF. Notes sur le glaucome en Tunisie.—*Rev. Prat. Malad. des Pays Chauds.* 1928. Sept. Year 7. Vol. 8. No. 9. pp. 453–455. [6 refs.]

³¹ BHADURI (B. N.). Ocular Findings in Amoebic Dysentery.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 303–305. [3 refs.]

Kala azar.—MUKERJEE³² has recorded a case of keratomalacia which he considers to have been due to kala azar. In another case of kala azar a patient suffered from a proptosis with symptoms resembling thrombosis of the cavernous sinus. The author thinks, however, that a haemorrhage had occurred at the apex of the orbit.

Malaria.—VILLARD³³ thinks that the ocular complications of malaria may occasionally escape the notice of practitioners in malarial districts unless they keep a careful watch for them. He furnishes a list of many and various troubles—from conjunctival hyperaemia to optic neuritis. The two most important, however, are undoubtedly dendritic ulcer and the haemorrhages which are sometimes found in cachectic patients.

Undulant Fever.—GODWIN³⁴ records a case of double optic neuritis in a woman aged 55 who was suffering from undulant fever. He considers that the optic neuritis was due to the specific toxins of the disease.

Leprosy.—KIRWAN³⁵ found that about 28 per cent. of the inmates of the Calcutta Leper Hospital suffered from eye complications. Ectropion is a common trouble, but, curiously, it seldom affects more than one eye. The upper temporal quadrant of the limbus is the most common site of lepromata, and both eyes often show symmetrical changes. The granuloma infiltrates the cornea in front and the sclera behind and extends round the limbus in a crescentic fashion. Descemet's membrane resists invasion until the process is very advanced. A superficial punctate keratitis is occasionally found, also a deep interstitial form which is due to an iridocyclitis. Inflammations of the iris and ciliary are common complications. KIRWAN thinks that the greyish nodules sometimes seen on the iris are not lepromata. Atrophic areas in the iris are very common. When treating the disease it should be remembered that keratitis is often due to an exposure caused by corneal anaesthesia and orbicular paralysis; proper protection should therefore be afforded. Complete excision of a narrow strip of conjunctiva, including all tissue right down to the sclera ("peridectomy"), is recommended for the leprous corneal infiltration. Subconjunctival medication was found of little use. A broad iridectomy occasionally proved permanently serviceable in cases of posterior synechiae and occlusion of the pupil. CREBBIN³⁶ was consulted at New Orleans by a patient recently discharged as cured from a leper colony. On examination both pupils were found to be oval. The right iris showed a small greyish-white deposit at the narrowest part of the oval. The left iris presented a typical, fine, white, punctate lepra nodule and some small atrophic areas. When seen again two years later the vision had failed considerably owing to an extension of the cyclitis and to a keratitis in the left eye. Degenerative changes progressed, and, seven years after the first consultation, a cataract extraction was performed, first in one eye and then in the other. Unfortunately the disease progressed

³² MUKERJEE (S. K.). Ocular Complications of Kala-Azar (Case Notes).—*Calcutta Med. Jl.* 1929. Mar. Vol. 23. No. 9. pp. 527-528.

³³ VILLARD (H.). Les complications oculaires du paludisme.—*Rev. Prat. Malad. des Pays Chauds.* 1928. Sept. Year 7. Vol. 8. No. 9. pp. 439-444, 447-450.

³⁴ GODWIN (Dean E.). Optic Neuritis in Malta Fever.—*Amer. Jl. Ophthalm.* 1929. Sept. Vol. 12. No. 9. p. 747.

³⁵ KIRWAN (E. O'G.). The Ocular Complications of Leprosy.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 289-296. [14 refs.]

³⁶ CREBBIN (Alexander R.). Affections of the Eye in Leprosy.—*Amer. Jl. Ophthalm.* 1929. May. Vol. 12. No. 5. pp. 384-387.

and the patient became quite blind. Nine years after he had been discharged from the Leper Hospital as cured he developed a leprous ulcer on his foot.

MISCELLANEOUS.—A thoughtful and interesting address by WRIGHT³⁷ draws attention to the importance of ophthalmology in connexion with research work and to the mutual part played by the clinician and the laboratory worker in the investigation of the causes of disease. The paper does not lend itself to abstract and is well worth reading in the original.

GNANADIKAM³⁸ deplores the overwhelmingly large number of cases of preventable blindness in India. Poverty, procrastination, scarcity of medical aid and illiteracy he considers to be the main causes. He suggests the provision of more rural hospitals and the organization of itinerant hospitals; these latter should be sources of education as well as of treatment.

ANKLESARIA³⁹ has summarized the current ideas regarding the causation of retinal detachment and has recorded an unusual case which occurred in a myopic lad aged 17. A cure resulted after a treatment which covered a period of six weeks' absolute rest. Injections of hypertonic saline solution were made into Tenon's capsule over the site of the detachment. The strength of the saline was increased gradually from 4 per cent. to 10 per cent. and 10 injections in all were administered.

REPORTS.—In the⁴⁰ Annual Report for 1928 of the Madras Government Ophthalmic Hospital WRIGHT devotes a considerable space to a discussion of the cataract work carried on in the institution. Novocaine blocking is now employed in nearly every case. The trunk of the seventh cranial nerve was blocked in some five hundred patients, and the ciliary ganglion in all cases of extraction by Barraquer's method. The conjunctival bridge flap is now much used; but it is considered that the tissues of the South Indian patient are exceptionally prone to bleed and this renders it more difficult to leave a perfectly clear anterior chamber free from all trace of clot than when the corneo-scleral section is employed. A peripheral button-hole iridectomy is the routine measure. 1,841 operations were performed for senile cataract during the year. Vitreous loss occurred in 1.87 per cent.; this is a low rate considering that complicated cataracts and those operated on by surgeons other than the Superintendent and the Assistant Superintendent are included. Regarding trachoma the Report states: "It is considered that numbers of cases which in the ordinary course of practice are diagnosed as trachoma either by the general practitioner or sometimes even the eye specialist, are not so." In an interesting

³⁷ WRIGHT (R. E.). Ophthalmology in Relation to Research. (Being the Presidential Address to the Medical and Veterinary Research Section of the Sixteenth Indian Science Congress, held at Madras in January, 1929).—*Indian Med. Gaz.* 1929. Apr. Vol. 64. No. 4. pp. 217-225.

³⁸ GNANADIKAM (G. Joseph). Causes of Blindness. A Statistical Report from the Swedish Mission Hospital, Tirupattur, Ramnad District for a Period of Ten Months (from 1st January to 31st October, 1928).—*Indian Med. Gaz.* 1929. Apr. Vol. 64. No. 4. pp. 194-195.

³⁹ ANKLESARIA (M. D.). Detachment of the Retina. A Complete Cure in a Myopic Case.—*Indian Med. Gaz.* 1929. Apr. Vol. 64. No. 4. pp. 186-190. [6 refs.]

⁴⁰ MADRAS. Administration Report, Statistics and Professional Rep. of the Govt. Ophthalmic Hospital, Madras, for 1928 [WRIGHT (R. E.)].—56 pp. With 4 figs. on 2 plates & 1 map. 1929. Madras. Govt. Press. [2 rupees.]

section on the causes and prevention of blindness the Superintendent states "the figures show that keratomalacia is a more frequent cause of total blindness in our hospital patients in the first year than ophthalmia neonatorum, although the frequency of attack is far greater in the latter." Keratomalacia, irritant remedies, ophthalmia neonatorum, congenital syphilis, and smallpox appear to be the chief causes of partial or total loss of sight during the first five years of life. "The application of irritant remedies appears to rank as at least the equal of ophthalmia neonatorum as a cause of blindness here and this is certainly insufficiently recognized." Tattooing with gold chloride was found to give a good immediate result, but its effect proved less permanent than Indian ink. The report notes but does not furnish particulars of an investigation of an epidemic of superficial punctate keratitis which occurred during the year. No fewer than 801 patients were treated for this complaint. Many cases of interest are recorded; and the publication is one which should be carefully read by everyone interested in ophthalmology.

H. Kirkpatrick.

ERRATUM.

T. D. B. Vol. 26. No. 6. p. 504, 2nd line of 4th paragraph (Trachoma). For *China* read *Japan*.

MISCELLANEOUS.

DACO. Le problème de la main-d'oeuvre indigène au Congo Belge. Etude médico sociale. [**The Native Labour Problem in Belgian Congo.**—*Bruxelles-Méd.* 1929. Mar. 24, 31 & Apr. 7. Vol. 9. Nos. 21, 22 & 23. pp. 597-606; 624-635; 658-665. With 3 text figs. [22 refs.]

The labour problem in Belgian Congo is bound up with that of depopulation which is due to both excess of mortality and an insufficient birth rate. The author's claim to write on this subject is based on 5 years' experience at the gold mines of Kilo.

In the recruitment of labour, camps must be constructed near the recruiting centres. Here the recruits are detained for a month during which various medical examinations are made and infections are treated. The recruits are then conveyed by rapid transport, accompanied by an agent of the medical service, to the place where the labour is required. Here is a stay of three months, with light training under the doctor's supervision. Hence the recruits are drafted to the definitive camps. The camp buildings must be made of material which can be disinfected, with proper latrines and kitchens, and discipline must be strict. Careful attention must be given to the diet. Recruiting, in fact, is regarded as a matter for the direction of doctors. Various indexes of physical fitness are considered; it is concluded that these figures have only a relative importance, and many other things should be considered before the doctor grants a certificate of fitness.

Prophylaxis and care of the workers is discussed at length. The conditions in the definitive camps must be as favourable as those of the recruiting camps. Intestinal parasitic infections are of the first importance. In 1927, of 3,706 labourers in the Kilo mines admitted to hospital for various causes the stools were examined 7,675 times, fresh and diluted or not with normal saline. Of these examinations 5,700, or 74 per cent., were positive. *Ascaris* eggs were found in 57 per cent., ankylostomes in 15, trichocephalus in 14.5, taenia in 3.3, *Schistosoma mansoni* in 3.2 per cent. Figures are given of association of two or more species of parasites, which was frequent. Ankylostomiasis and ascariasis are then considered in detail. Instances are given of respiratory conditions which were relieved by administration of santonin and the author thinks there is a definite association between these conditions, based of course on the life-history of the worm. Apart from this, however, he does not think that ascariasis is the cause of any marked loss of efficiency.

Similarly, the association of respiratory affections and ankylostomiasis has struck him. Among 65 patients admitted in the Western Division, a forest region where ankylostomiasis is the rule, there were 6 cases of catarrhal bronchitis, 5 of pulmonary tuberculosis, 2 of serous pleurisy, 33 of enlargement of mediastinal glands and 19 of chronic hepatization of the lungs. In the last instance pneumonia develops normally for about a week but resolution does not occur. The cuti-reaction for tuberculosis was negative in all as was also the case in the mediastinal adenopathies. In favourable cases improvement was slow and repatriation was at last necessary; however, some of these natives returned some months later and presented themselves for re-engagement; the lesions of glands and lung had completely disappeared.

In the consideration of prevention the author gives the preference to the smoke latrine, and lays stress on the need for its regular and careful maintenance.

Stress has been laid on the influence of recruiting of labour on the family, and especially on the birth-rate. Men in the prime of life leave their villages and the birth-rate falls. The remedy is to encourage marriages of workmen in their new localities and to provide medical care for the women and children. Of 421 women examined 184 were sick; 16 had active syphilis, 56 cervical laceration, 34 perineal tears, 27 prolapse of uterus, 9 retroversion, and 41 metritis. Syphilis apart, these conditions are nearly all due to child-bearing; the metritis is attributed to gonorrhoea. At an infant welfare centre started at the Kilo mines in 1925, 180 women brought 265 children. The results of the examinations of these children are tabulated at 5 age periods up to 4 years in respect of the general state and morbid conditions. 79 per cent. were below the average and 58 per cent. had some chronic pathological lesion (4 large liver, 69 large spleen, 36 rickets, 13 umbilical hernia, 32 big belly). The conclusions reached were these: The black baby is often very fit at birth and remains so as long as breast feeding is exclusive, but mixed feeding is habitual from between the 6th and 7th month—sweet potato, maize flour, meat—and this causes indigestion and deterioration. The mortality is about 40 per cent., and the deaths usually occur in the first year.

The author studied the weights of 689 babies who were brought more or less regularly during 2 years. They noted that the average weight at birth was superior to that of many European children, and that the weight increased steadily for the first four months; from the 4th to the 8th month it slowed down, being 285 grammes per month against 500 grammes as in Belgian babies. The 8th to the 12th month the monthly increase was 160 grammes as against 250 in Belgium. A curve shows that from the fifth month the weight of the black baby steadily diverges from that of the white and that at the end of the 2nd year the difference is nearly 2 kilos.

In 45 infants the dates of appearance of the teeth were studied. The successive dental eruptions occurred 61 times at the normal date and 61 times after a delay of from 1 to 11 months. The milk teeth were often carious, which the author attributes to want of cleanliness of the mouth and to rickets and hereditary syphilis. He is convinced that the African woman can be educated in the care of her children and thinks that she should be attracted to the centres by suitable rewards.

A. G. B.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1929. Mar. Vol. 21. No. 3. pp. 430-443. [3 refs.]—*Les services de l'Assistance Médicale indigène en Afrique Occidentale Française, d'après les instructions de 1926 et 1927 du Gouverneur Général Carde, relatives à l'orientation et au développement des services de Santé et de l'Assistance.* [Medical Assistance to the Natives of French West Africa.]

This official brochure is of much interest and importance but contains too much detail for effective summary. The sections are headed: (1) End to be aimed at; (2) General organization; (3) European doctors; (4) Native sanitary personnel; (5) Vital statistics;

(6) Administrative measures ; (7) Hygiene of railways ; (8) Hygiene of labourers ; (9) Co-ordination. It is laid down that it is the aim of the Medical Assistance (a) to combat infant mortality by education of the mothers and by progressive penetration of ideas of puericulture among families ; (b) to combat adult mortality by the detection of social diseases (syphilis, leprosy, tuberculosis) and the application of methods of prevention, and by the recognition of epidemic foci and the prompt undertaking of measures to extinguish them. European doctors must have freedom of movement effectively to supervise the native personnel. It is calculated that 150 doctors are now required in French West Africa, but that in about five years the number should reach 200 and eventually 250.

Under native personnel the midwives are discussed at some length. It is noted that there is a tendency for them to practise their profession in the Maternités instead of going into the villages ; here it is that their work should lie and it is essential that they be familiar with the language of the country. Umbilical tetanus should be banished by the same method as in Cochin China (see MONTEL, below).

The form of statistics is laid down. There are to be three tables annually with distinction of sex : I. Living on December 31st, in 4 classes—infants, up to 3 years ; children from 3 to 15 ; adolescents and adults ; old people, 50 and upwards. II. Deaths during the year in the same categories. III. Births during the year (stillbirths separate).

Under administrative measures, which include diet, infant hygiene, general hygiene, education, stress is laid on the protection of children against cold. Over large regions children go naked up to puberty and in the cold season the mortality from lung affections is high. The Administration and private initiative must convince the parents of the need of clothing and the latter could distribute small garments.

A. G. B.

TROLLE. Impression sur l'organisation du service médical de l'Angola. [**Notes on the Organization of the Medical Service of Angola.**]—*Bruxelles-Méd.* 1929. Feb. 3. Vol. 9. No. 14. pp. 401-406.

Dr. Trolli, Médecin en chef of Belgian Congo, visited Angola to attend a meeting of doctors of the two colonies at Loanda, held in consequence of the Belgo-Portuguese Convention of July 1927, the objects being to examine the medical position on the frontier and to concert measures of collaboration between the two medical services. On his way back he visited sleeping sickness areas to the north and regained his own colony again near Maquela da Zombo and Thysville. He was especially interested in the organization and working of the medical assistance to natives. In each of certain districts besides the ordinary medical service, personnel is attached specially and exclusively to Native Assistance ; the head of this is the chef de zone, a doctor having under him, besides white and black medical personnel, European administrators. The inhabitants of the district are methodically enumerated. As each native is recorded he is medically examined for all diseases as well as sleeping sickness, gland puncture being made if necessary ; the infected are treated with atoxyl, yaws patients with stovarsol or bismuth ; all are vaccinated against smallpox, wound and ulcers are dressed, and all without exception are atoxylized. Such an examination

is made in principle every 12 or 15 days, fresh natives being added to the roll and new cases treated. The atoxyl treatment consists of 12 one-gram injections, general atoxylation of 6 atoxyl injections and a rest of 4 months, followed by a fresh examination. In fact, the organization is not yet complete and the doses and intervals have to be varied. The atoxylation posts are so sited that no natives have more than one or two hours' journey. For groups of posts a rural hospital-dispensary receives the more serious sleeping sickness cases. A doctor attends at least once a month; an agent sanitaire is always present.

The author notes that the network of motorable roads is extensive, and that where the Government has not made roads the natives themselves have supplied them to enable medical centres to be formed. He notes also that the natives are subject to strict discipline and that the doctors are clothed with great authority. Every native who without good cause absents himself from the medical visit is liable to a serious fine or some days' work in the construction of dispensaries or in the plantations around them. The fines are levied directly by the doctors, and there is a service of medical police charged with the discovery of delinquents. The discipline extends also to individual Europeans, traders or companies. Their employees must be treated just as the natives in their chiefdoms. If there is no medical service the doctor of the Assistance looks after them and from the employer is recovered a considerable sum proportional to the number of employees. Where there is a doctor, he is under the direct control of the Government doctor under whose directions he works. The head of the Government medical service can even insist on the removal of the private doctor if he considers him unsuitable. Obstructing employers are liable to large fines. The success of this programme depends on attracting a numerous personnel, capable and keen. This object is attained by granting to the personnel of the Native Medical Assistance such "indemnities" that itinerant and laborious service is regarded as a privilege. By this means the doctors are induced to stick to their jobs, and there is, in fact, much enthusiasm for the service. They are not occupied exclusively with sleeping sickness and they have sufficient secretarial assistance. The funds for these payments and the purchase of drugs do not come from the ordinary budget, but from fines, dues paid by companies, fees for treatment by doctors who cannot take fees, gifts, contributions, and from a moiety of the native taxes. Dr. Trolli saw the system at work in several areas, of which he gives details and speaks of it with enthusiasm, though he has to admit that there are difficulties about applying it to Belgian Congo.

A. G. B.

DAMAS MORA (A.). Os serviços de saúde em Angola e a obra da assistência médica aos indígenas. [**Health Services in Angola and the Work of the Native Medical Assistance.**].—*Bol. da Assist. Méd. aos Indígenas*. Loanda. 1928. Sept. Vol. 2. No. 9. pp. 87-94. French summary p. 94.

In 1921 the health service of Angola consisted of 25 doctors and 40 infirmiers; in 1928 the respective numbers were 73 and 88 European infirmiers, and there were also 7 assistant doctors, 16 private doctors

and more than 100 native infirmiers. Hygiene propaganda in the zones where Native Assistance operates is now possible in the direction of small-pox, trypanosomiasis, venereal diseases. The Native Assistance should be extended all over the colony, but "the budget refuses to march in step with the sanitary provisions." It is suggested that the natives shall contribute the sum required for each district, through the native taxes. The author foresees a time when direct assistance, hospitals and dispensaries will be in charge of municipalities, health measures and prevention in the charge of the State.

A. G. B.

HENRY (E.). Rapport sur le fonctionnement des nourrissons de Léopoldville-Ouest (année 1928). [**Report on the Infant Welfare Centre at Leopoldville-West for 1928.**]*—Ann. Soc. Belge de Méd. Trop.* 1929. June 30. Vol. 9. No. 2. pp. 179-183.

This centre was founded in 1913. In the year under review 82 children were entered, of whom 63 were new-born, and 150 attended the consultations: deaths numbered 11. The chief diseases treated were, in order of prevalence, malaria 187, digestive troubles 83, helminthiasis (hook and round worms) 46, bronchitis 30, pneumonia 28. Of the deaths 4 were due to pneumonia and 2 to post-pneumonic meningitis. Of blood films of children 136 were positive with schizonts of "tertian" and 24 with gametes of "tertian"; quartan parasites were seen 5 times and trypanosomes once. In 12 instances the mother's blood was positive for malaria, the child and placenta negative. 67 infants were "premunized" with B.C.G. The B.W. reaction tested in 37 pregnant women was positive 17 times; after treatment there were 3 instances of abortion.

A. G. B.

BOTE (D. J.). El problema sanitario en Fernando Poo. [**Health Problems in Fernando Po.**]*—Medicina Paises Cálidos.* Madrid. 1929. May. Vol. 2. No. 3. pp. 271-273.

Trypanosomiasis has been for some time regarded as the most important of the conditions to be dealt with in Fernando Po, but as a result of the author's investigations it would appear that hookworm infection exists up to 65 per cent. and malaria is rife, and he thinks that these are more important problems calling for immediate action than is sleeping sickness.

H. Harold Scott.

- i. VINT (F. W.). **One Year's Post-Mortem Work on Natives of East Africa.***—Kenya & East African Med. Jl.* 1929. Mar. Vol. 5. No. 12. pp. 383-393.
- ii. MACKINNON (M.). **One Year's Post Mortem Work on Natives in East Africa.** [Correspondence.]*—Ibid.* June. Vol. 6. No. 3. pp. 88-89.

i. The author, Assistant Bacteriologist, Kenya, performed 176 autopsies on natives at Nairobi between October 1st, 1927, and

October 1st, 1928. The principal causes of death were as follows :—

Pneumonia	...	...	...	...	...	74 cases.
Typhoid	...	...	...	...	...	21 "
Tuberculosis	...	...	...	...	...	16 "
Septicaemia other than plague	...	...	...	...	...	11 "
Plague	...	...	...	...	...	9 "
Malaria	...	...	...	...	...	7 "
Dysentery	...	...	...	...	...	7 "
Heart Diseases	...	...	...	...	...	6 "
Liver conditions	...	...	...	...	...	5 "
Scurvy or food deficiency	...	...	...	...	...	3 "
Nephritis	...	...	...	...	...	3 "

The diagnosis was confirmed, where necessary, histologically or bacteriologically. In the 74 cases of *pneumonia* the right lung was affected 54 times, the left 12, both 6 times. 64 were over 18 years, the rest under. There were 29 cases of apical infection against 20 of the middle and lower lobes; the preponderance of apical infection shows that the condition is similar to that which prevails in white children; the fatality rate is another point of analogy. As to the stage reached, there were 12 cases of acute congestion, 21 of red hepatization, and 40 of grey hepatization. The complications found were pneumococcal meningitis 13, pneumococcal pericarditis 7, both conditions together 3. The proportion of these complications, 23 out of 74, is evidence of the severity of pneumonia among the natives. The pericarditis cases were all associated with a right-sided pneumonia, which the author suggests is due to the fact that the lymph ducts from the heart drain into the right tracheobronchial lymph glands. Figures of seasonal incidence are given but appear to be faulty.

All the 21 cases of *typhoid* showed typical ulceration in the ileum and in nine perforation had occurred. In three of the others there was inflammation of the descending colon with, in one instance, gangrene of the mucous membrane of the sigmoid flexure. Whenever the liver was examined histologically the usual necrotic areas were found. Half of the cases occurred in the quarter October to December, which is the rainy season. In one case with all the appearances of true typhoid no typhoid organisms were found but a bacillus indistinguishable from *Bact. dysenteriae* Shiga, in the ulcers as well as in the inflamed Peyer's patches; the large intestine showed no inflammation.

The number of cases of *tuberculosis* suggests that this is a common cause of death. The commonest form was acute miliary tuberculosis, with both lungs densely studded. Eight of the sixteen had cavities but in only 2 were they larger than a small bean. A case is given showing the similarity between generalized tuberculous adenitis and Hodgkin's disease.

In *plague* it is common to find a simple picture of septicaemia; buboes absent, petechial haemorrhages on the heart surface, blood-stained fluid in the pericardial and peritoneal sacs; the diagnosis depends entirely on the microscope.

As to *dysentery*, in no case was amoebic ulceration of the intestines seen.

The rest of the paper concerns observations made of the organs. In 41 cases there was disease of the intima of the aorta—raised yellowish atheromatous-looking areas, fairly soft and pliable and not ulcerated, varying from pin head points to half-an-inch across, not only in adults but also in youths aged 17. Vegetations were found on the

mitral valve in 9 instances and on the aortic in 6 ; there were 5 cases of old adherent pericarditis.

A discussion ensues on the size of the liver in natives ; in the majority the liver was larger in proportion to the body weight than in Europeans. There was little naked-eye cirrhosis, but of 60 specimens examined by the microscope 20 had an increased amount of periportal fibrous tissue and four a fine cirrhosis. A large liver abscess was found in one instance ; scrapings were negative for amoebae and only gram-negative bacilli were found. Fourteen cases of parenchymatous nephritis were seen and two of chronic interstitial nephritis. In 104 cases there was a complete record of the helminths present in the intestine.

Negative	...	...	...	...	19 cases.
Ascaris lumbricoides	...	...	...	present in	42 "
Taenia saginata	...	...	...	"	58 "
Ancylostoma duodenale	...	...	...	"	43 "
Trichuris trichiura	...	...	...	"	26 "
Strongyloides	...	...	...	"	5 "
S. mansoni	...	...	...	"	2 "
E. coli cysts	...	...	...	"	2 "
Hymenolepis nana	...	...	...	"	1 "

ii. Dr. Mackinnon writes of the "extreme prevalence and high mortality of pneumonia and broncho-pneumonia among all races in Kenya." His experience, at Nairobi, is chiefly among Asiatic children. He feels convinced that the high fatality rate of these diseases is due to faulty nutrition of expectant mothers and young children, and suggests that research on these lines should be carried out in the native Civil Hospital, combined with intensive investigation into the bacteriology.

A. G. B.

WEBB (W. Leslie). **A Note on the Sub-Dispensary System in Uganda.**
— *Health & Empire*. 1928. Dec. Vol. 3. No. 4. pp. 289-295.

This "note," by the Deputy Director of Medical Services, Uganda, is an interesting contribution to the problem how to provide medical aid for the native in the vast, sparsely populated areas of Tropical Africa, given the general indifference among the tribes to disease, their initial suspicion of European medical practice and deep-seated objection to spending money on medicine or doctors. In the year 1927 the Medical Department of Uganda spent over £132,000, or 10.25 per cent. of the total revenue. No larger proportion can ever be expected and the question arises how to spend the money so as to afford the greatest relief to the greatest number of sufferers from diseases which are a menace to the general health and at the same time readily respond to treatment.

Excluding epidemic and minor diseases, the maladies most commonly treated in Uganda are syphilis, malaria, conjunctivitis and trachoma, yaws, ulcers, gonorrhoea, helminthiasis, relapsing fever, leprosy and trypanosomiasis, nearly all diseases effectively treated on routine lines by a specific drug.

Obviously it is impracticable to provide European practitioners at an average cost of £900 per annum for the mass of patients affected. Indian assistants cost £300. There remains the African assistant

whose salary varies between 30s. and 120s. a month, or £18 to £72 a year. The question, what service can an assistant render for such a sum, is answered by Dr. Webb thus :—

“ He can recognize syphilis and yaws in their various manifestations, treat these conditions by routine courses of injections of salvarsan substitutes, bismuth and mercury, and keep a detailed case record of the condition and of treatment given. He can recognize leprosy and treat it by intravenous or intramuscular injections of ‘moogrol’ or by the subcutaneous infiltration of ‘hydnocreol.’ He can recognize gonorrhoea and treat it, not very effectively, it is true, but well enough to afford a certain relief. He can diagnose sleeping sickness clinically and treat it with injections of modern specifics. He can recognize pyrexia, make an intelligent clinical diagnosis of its cause and treat it with stock preparations. He can treat all minor diseases in a routine manner, and carry out the local treatment of such conditions as ulcers or abscesses. He can apply first-aid treatment in the case of accidents, and he can in most cases recognize a serious condition beyond his knowledge as one to be brought to the notice of his medical officer as soon as possible. This is the work being performed to-day by nearly 100 native assistants in Uganda at the salaries mentioned in the previous paragraph. As educational facilities improve there is no reason why native assistants in general should not be taught—as a few have already been taught—to examine blood films and stools microscopically and to undertake routine treatment on the results of their findings.”

To the objection that the intravenous administration of synthetic drugs by relatively ignorant natives is dangerous practice the reply is made that no deaths and few disabilities have been recorded and without these services large numbers with syphilis and yaws would have remained untreated.

The author goes on to describe the way in which use is made of the native medical assistant. There are in Uganda about 19 administrative stations where medical units, consisting of a hospital with one or more European M.O.’s, one or more Indian assistants, and native assistants are found and in each district 2–7 sub-dispensaries, each under the charge of a native medical assistant with one or two juniors. They are situated on roads open to motor traffic and the utmost distance from the station hospital is 50 miles. There were 53 sub-dispensaries in action in 1927.

“ Each sub-dispensary is built on a one to five acre plot and consists of a three-roomed out-patient department, male and female attendants’ quarters and a varying number of outhouses and subsidiary buildings. The buildings vary in construction in different districts, but are usually of a temporary or semi-permanent structure, i.e., with mud and wattle or sun-dried brick walls. An endeavour is made to provide a corrugated iron roof and a cement floor whenever possible. The total cost of such a dispensary is about £300. No provision is made for in-patients, but it has occurred in every case that natives too disabled or disinclined to walk for their daily treatments have built themselves huts on adjoining ground. In one case a village of over sixty huts and nearly 200 inhabitants has been built in this way.”

Some of the larger deal with 200 patients daily and the total number of new cases seen in the year exceeded 250,000. “ More than half the recorded out-patient work of the Protectorate was undertaken at sub-dispensaries by native medical assistants.” Case sheets are kept in the more serious cases or those in which treatment is likely to be prolonged, and the district M.O. pays a visit once a week if possible : patients in need of in-patient treatment can return with him. All

sub-dispensaries must be reachable by car and the district M.O. must be provided with motor transport.

The training of natives as hospital assistants is best undertaken centrally by a specially selected European staff. The initial difficulties are illustrated by the fact that in 1927 79 learners were admitted for training, 30 were dismissed as unsuited and 26 gave up. Without sympathy with natives no medical officer in charge of training will succeed.

In recent years native governments have shown a desire to maintain in part or altogether the sub-dispensaries in their districts and it is likely that eventually the Government will be relieved of their cost. The sub-dispensary accustoms the native to European methods of treatment and has a further value.

"The sub-dispensary serves to-day to a small extent as a centre for the propagation of simple hygienic principles amongst the natives. It could be further developed as a centre for intensive health propaganda, or as a starting-off place in a campaign against a particular disease, such as syphilis, leprosy or hookworm, or for any other purpose where the goodwill of the native towards an institution he knows is a factor which may be all-important to success."

It is noted that two of the larger missionary societies in Uganda have independently developed much the same system for Maternity and Child Welfare Centres, namely small fixed units under native control.

A. G. B.

LANZONI (A.). Notizie di geografia e nosografia della regione di Ilo-Babur (Abissinia). [**Notes on Ilo-Babur and its Diseases.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Feb. 1. Vol. 10. No. 2. pp. 87–90. English summary p. 91.

The Province of Ilo-Babur is in Western Abyssinia. The capital, Gorè, 2,000 metres above sea-level with a mild climate, is called a veritable paradise. The rainy season is from April to November, during which the fall is heavy. It is a land flowing with coffee and honey. Barley grows well and is made into a fermented drink, and there is much maize. As regards disease, syphilis and gonorrhoea are rife, goitre is very frequent amongst the women of all ages, and pellagra common in those living almost exclusively on maize; elephantiasis of legs and scrotum is common, as is also mossy foot. In Gambella malaria is extensive and is known as Gambella disease. Blackwater fever is met with and one case seen by the author was treated with Calmette's antivenin and rapidly improved [the dose is not stated].

H. Harold Scott.

EPAULARD (A.), HORNUS (P. Ph.) & DELPY (J. J. P.). Notes sur la pathologie Marocaine. [**Notes on the Diseases of Morocco.**]—*Arch. Méd. et Pharm. Milit.* 1929. Mar. Vol. 90. No. 3. pp. 275–361. With 31 charts, 2 coloured plates & 7 figs.

This paper is almost a treatise on the infective diseases of Morocco, from the clinical side. Case records are included.

A. G. B.

SOUTH AFRICA, UNION OF. Report of the Committee* appointed to inquire into the Training of Natives in Medicine and Public Health. With Appendices.—36 pp. 1928. Pretoria: Govt. Printing & Stationery Office. [1s. 9d.]

The matters referred to the Committee whose report is under consideration were :—

“(i) The advisability of establishing within the Union a College for the training of Natives in Medicine and Public Health; and if this principle is accepted :

“(ii) the most suitable place for the establishment of such a college ;

“(iii) the initial cost and the amount of the annual recurrent expenditure;

“(iv) the question of the certification of Natives so trained.”

In comparison with the work of Colonial administrations in other parts of Africa little has been done in the Union to organize adequate and efficient medical services among the native population. In most parts of the country the natives have to depend for medical attention upon their own medicine-men except where they have been fortunate enough to be within reach of a missionary doctor. In the Native Reserves there may be one doctor to 40,000 persons. The natives number over $4\frac{1}{2}$ millions, so that one medical man for every 5,000 would mean over 900 doctors. The dangers of the present state are the spread of infectious diseases from areas where they are endemic and deterioration and eventual failure of the labour supply. The remedy, according to the Committee, is the institution of a Government Native Medical Service comprising medical practitioners, nurses and health assistants, all of whom would be full-time servants of the Government. The general plan would be to station a native medical officer at a centre where there is provision for the hospital treatment of natives and put under him one or more health assistants. In the area under his control would be two or more simply-built village nursing stations of 2 or 3 beds, each with a resident native nurse-midwife in charge. The hospitals and medical staffs attached to missions would be incorporated in the scheme. At the outset the majority of doctors would have to be Europeans, as would probably be some of the health assistants; but natives should be trained for these services, for the number of Europeans at present taking the medical course is insufficient for the needs and is not likely to increase. The advantages of having native medical practitioners to serve the needs of the native population are discussed.

The character of the medical training is then considered and the Committee decided that there should be the same standard for both Europeans and natives, and support this opinion by seven sound reasons, the strongest of which appears to be that the natives themselves demand it.

The question then arose whether natives should be trained in South Africa or elsewhere, and the preponderating weight of opinion was in favour of South Africa. It was calculated that £500 would be more than sufficient for the course at Capetown or Johannesburg, and the recommendation is made that loans should be made available from native funds for this purpose, the Government reserving the right to retain the services of the practitioner where it is considered desirable

* *Chairman* : Dr. C. T. Loram. *Members* : Dr. W. Darley-Hartley, Dr. W. A. Murray, Prof. R. A. Dart, Dr. J. C. Pretorius. *Member and Secretary* : Mr. W. G. R. Murray.

during the repayment of the loan. A proposal to develop a non-European medical school was negated on the ground of expense. The final recommendation was that following on the completion of a preliminary year at the South African Native College at Fort Hare the training of natives as medical students should be undertaken at Johannesburg as a non-European branch of the medical school of the University of the Witwatersrand. It is suggested that arrangements might be made with various administrations in Central Africa whereby natives might be received from these areas for training as medical men and health officials.

The Committee notes the deplorable lack of native midwives and recommends the offer of bursaries of £25 a year each to hospitals which will undertake to give a year's training in maternity work to a number of approved native women; the instruction should be through the medium of the native tongue. An estimate of the cost of the proposals is appended. Appendix A is Sir Edward THORNTON'S account of the Native Medical Services in French West Africa and Appendix D a report of the Lady Coryndon Maternity Training School in Uganda. [This report should be studied by all African administrations dealing as it does with a problem that is urgent throughout that continent.]

A. G. B.

WATT (J. M.). **Native Medical Education and Medical Service to the Natives in the Territories.**—*Jl. Med. Assoc. South Africa*. 1929. May 25. Vol. 3. No. 10. pp. 271-273.

A discussion of the Report of the Committee appointed to enquire into the training of natives of South Africa in medicine and public health, the recommendations of which are in essentials approved.

A. G. B.

MCGUIRE (G.). **Hints on the Village Nurse Scheme.**—*Indian Med. Gaz.* 1929. Feb. Vol. 64. No. 2. pp. 95-99.

The Civil Surgeon of Karnal, Punjab, writes an interesting paper describing how in his district medical aid is brought to the women in the villages who are not reached by rural dispensaries with a male doctor in charge. The field is now occupied by the indigenous dai whose fees for a confinement are 4 annas for a boy and 2 for a girl, for which she has to visit for ten days, and who is notoriously dirty, interfering and incapable. The author aimed at having a nurse or nurse-dai in each dispensary and subscriptions came in so well that now the District Board makes this provision if a subscription of Rs. 1500 has been raised locally. The scheme is to employ the illiterate nurse-daïs first, draft them out into the villages with the necessary equipment for normal labour and replace them by a more educated type with a nurse's diploma.

He describes how such a scheme can be brought into existence. The Ludhiana Medical School is the chief training centre, but this and other Christian Hospitals are unable to meet the requirements of the Punjab. Candidates can easily be found and it is suggested that scholarships be provided at the rate of Rs. 30 per mensem for nurse candidates and Rs. 20 for nurse-daïs; the former, who must know

some English, should have a four years' training; the latter who can read and write the vernacular or are illiterate obtain a certificate after two years. The indigenous dais should be induced to train for 6 months. At present they are ignorant of cleanliness and the sums they receive are hardly sufficient for existence, much less to provide the patients with necessities. Indigenous dais who are unwilling to train should be brought under control by a monthly payment of Rs. 5 and made to send for the trained dai in every confinement. Unless the country has a sufficiency of trained dais it will be impossible to prevent the untrained from practising their profession. The difficulties to be overcome are stated. Among facilities to be granted to trained nurses are the following: A monthly allowance of Rs. 5 should be paid and private practice debarred. Free medicines, dressings, and diet should be authorized for all poor patients. A female assistant at Rs. 10 should be provided to do dirty work. Husbands of nurses should be provided with posts such as that of schoolmaster in the same village. Post-graduate work should be insisted on. The pay for trained indigenous dais is to be Rs. 25-Rs. 35 per mensem and free quarters. A table is given showing that the scheme is in operation in 23 places in the Karnal district; the number of confinements attended is given in each instance.

[There seem to be three grades in question here—indigenous dais, nurse-dais and trained nurses; their respective duties and emoluments are not always clearly distinguished.]

A. G. B.

OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. Comité permanent de l'Office International d'Hygiène Publique: Session Ordinaire d'Octobre 1928. [**Standing Committee of the International Office of Public Health: Ordinary Session October 1928.**—13 pp.]

The Standing Committee of the *Office International* held its ordinary session from October 15th to 24th, 1928. Representatives of 36 countries were present. Various questions raised by the application of the International Sanitary Convention, 1926, came under notice [see *Bulletin of Hygiene*, Vol. 2, pp. 150-1]. A communication from the Sanitary Council of Egypt on the subject of the Hedjaz Pilgrimage has led to the formation of a special Committee of delegates from countries specially interested; this Committee has made recommendations for the control of the pilgrim traffic, with reference to routes, description of ships, health, passports, etc. The Committee will remain in being. Early in 1929 the publication of an *Annuaire sanitaire maritime international*, was to be commenced; it will deal with sanitary organization at the ports. The *Office* has received from the signatory governments a list of ports qualified to effect the deratization of ships and consequently to grant certificates; the list will be published in the forthcoming *Annuaire*. Other points under consideration were bills of health in relation to the consul's visa, artificial lighting for port sanitation, rat-guards on cables, measures against introduction of disease by aeroplane, treatment of seamen for venereal disease, antidiphtheritic serum.

Concerning yellow fever the observation is made that a reappearance in one part of the world is soon followed by others in unconnected parts, e.g., the outbreak at Rio de Janeiro, following on those on the West Coast of Africa. At Rio, it is stated, persons affected were chiefly

newly arrived Portuguese though the absence of yellow fever for 23 years puts out of the question any general acquired immunity of the population. Stress is laid on the importance of detecting the abortive cases (*cas frustes*), which implies compulsory notification of cases of fever, their isolation in a gauze protected room for an observation period of 6 days and, if possible, the inoculation of blood to *M. rhesus*. The Office has appointed a Committee to study and correlate the points of view of the different countries concerned.

Cholera in Indo-China and in British India is discussed. In Indo-China in 1928 5,000,000 persons were vaccinated.

Interesting epidemiological details are given of plague. In Madagascar its frequency followed an ascending curve from 1923-4 onwards; in 1927 a drop in the incidence appears to be related to intensive vaccination—277,000 persons vaccinated out of 900,000 in the zone affected.

Remarks are made on post-vaccinal encephalitis and anti-tuberculosis vaccination. From a consideration of the incidence of undulant fever in several countries of Europe it is concluded that the virulence of Bang's bacillus seems to vary with the country, which indicates the need for methodical researches. Other subjects discussed are polyomyelitis, the dengue epidemic in Greece, leprosy with special reference to BARGEHR'S lepromine reaction.

A. G. B.

OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. Comité Permanent de l'Office International d'Hygiène Publique: Session Extraordinaire de Mai 1929. [**Standing Committee of the International Office of Public Health: Extraordinary Session May 1929.**]—17 pp. [4 refs.] 1929. Paris: Office Internat. d'Hyg. Pub., 195 Boulevard Saint-Germain.

The account of the spring session, May 13th-22nd, contains much that is of general interest. Space admits only a few extracts from the varied contents. Several questions arising out of the International Sanitary Convention of 1926 were considered, e.g., periodical deratization of ships, certificates of deratization or exemption therefrom. The point emerges that the article here in question was drawn up with a view to a gradual and steady increase of rat-proofing. The employment of wireless telegraphy in case of quarantine measures, the insertion in the International Code of Signals of a medical section dealing with radio-medical consultations at sea, the position of ship's doctors, were discussed; the chief points under consideration in the last case were, the professional education of ship's doctors, their powers in regard to the safeguarding of the public health and their responsibilities. The subject of rat-guards again received attention. It was judged that the sanitary control of aerial navigation should be continuously studied. The subject of passports left over from the report of the Pilgrimage Commission which met at Beyrouth in January was under discussion, especially whether or not there should be a uniform passport.

Coming to diseases, the time has arrived, the Office believes, for a revision of our ideas about smallpox and vaccinia. The persistence in Great Britain and the U.S.A. of an epidemic of mild smallpox of alastrim type and in Far East and North Africa of the classical type raises the question whether in statistics and in the application of

measures of international prevention there should be some distinction in appellation. Other questions, demanding answer, are set out, including that of post-vaccinal encephalitis.

In Indo-China vaccinations against cholera have passed 8,000,000 in 2 years. Their effectiveness has been greater in places where vaccination was almost complete than where it was only partial. Whereas in Tonkin and Annam the evidence is that the disease is water-borne, in Cochin-China it passes direct by contagion.

Vaccination by BCG is discussed. Attention is drawn to the remarkable variation in the stated mortality of infants living with tuberculous mothers in various European countries, varying from 3 per cent. in Lancashire and Oslo to 25 per cent. in Roumania and Belgium. Till this is explained conclusions as to the efficacy of the vaccine are premature. Bargehr's reaction in leprosy is again discussed and dengue. Of undulant fever it is noted that in a district of Sweden epizootic abortion was found in 78 per cent. of farms situated near rivers or lakes, but that 85 per cent. of farms distant from water were free. [No conclusion is drawn from this statement.]

As bearing on the suggestion that general paralysis occurs in persons who have been inefficiently treated for syphilis it is stated that a Russian and German Commission examined 4,000 persons in the region of Lake Baikal, who had received no treatment, and found that tabes and general paralysis were not rare.

A. G. B.

CHRISTOPHERSON (J. B.). **A National Outlook on Tropical Medicine. President's Address.**—*Proc. Roy. Soc. Med.* 1928. Dec. Vol. 22. No. 2. pp. 115-120 (Sect. Trop. Dis. & Parasit. pp. 1-6). [1 ref.]

Speaking of parasitic disease Dr. Christopherson lays down that the primary attack should be on the parasite in the human being: the aim should be adequate disinfection of the patient to prevent infection of the intermediate host. He applies this to malaria, ankylostomiasis, bilharziasis, leprosy. The "indirect principles of medicine" [which seems here to mean sanitary and hygienic measures] are not easily applied in the tropics, "Natives inhabiting tropical countries take medicines very well, but they take hygiene very badly." He illustrates his thesis by bilharziasis in Egypt. KHALIL estimates that half-a-million persons present themselves annually for treatment. The fellah has no objection to intravenous injection. Antimony tartrate is cheap and cures 100 per cent. If treatment were brought to the villages by mobile hospitals it would be possible to treat a million persons a year, a substantial step towards eliminating bilharzia from Egypt. He goes on to consider the effect of widespread endemic infection on the moral and material condition of a community, with Egypt again as the text. The great majority of the Egyptians, 14,000,000 in number, are agriculturists, most of them embarrassed by disease. The four serious diseases, endemic from ancient times, are bilharziasis, ankylostomiasis, pellagra and ophthalmia. MACCALLAN estimated that 75 per cent. have granular lids; over half-a-million were blind in one or both eyes. Pellagra fills Egypt's two asylums. 75 per cent. suffer from bilharzia infection, in some districts 94 per cent. Ankylostomiasis is the cause of one-fourth the total deaths; this and bilharziasis account for a third of the deaths. It is a fair statement, Christopherson thinks, that these diseases affect the intellectual capacity as they affect the

physical. [There does not seem to be much evidence for this but] it is stated that since all newly enlisted soldiers have been treated for ankylostome and bilharzia infections the efficiency of the army "has thereby been very effectively increased." He suggests that when the diseases oppressing them have been banished the fellahin will respond to education, cease to be "2,000 years behind the times," and enter on a new era of prosperity. [Dr. Christopherson is a protagonist of the doctrine of treatment of the human patient, but he himself writes: "Constant re-infection, to which Egyptians who live in endemic districts are exposed, renders ankylostomiasis especially deadly.]

A. G. B.

CONNOR (Frank Powell). **The Surgical Aspects of Tropical Diseases. With Some Remarks on the Conditions under which Surgery is Practised in the Tropics.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Nov. 25. Vol. 22. No. 3. pp. 219-238.

An instructive paper in which Sir Frank Connor maintains that the need for the surgeon as distinguished from the general practitioner in the tropics is a very real one, and points out that in the past the surgical aspects of tropical diseases have been little realized and less written upon. Much surgical work has been done, but the multifarious duties of the workers, and lack of co-ordination, have prevented the compilation of thoughtful records and the passing on of the special knowledge gained. Overworked, and with little leisure for thought and study, the surgeon in the tropics, considering his opportunities, has done but little to advance the science and art of surgery. As outstanding examples, however, of noteworthy achievement, KEEGAN's improved operation of rhinoplasty, the same surgeon's work in litholapaxy, Henry SMITH's intracapsular operation for cataract, ELLIOT's work in connection with the treatment of glaucoma, and FREYER's operation of prostatectomy are mentioned. His own experiences as a consulting surgeon in Mesopotamia during the war, and the opportunities there provided, lead the author to define tropical surgery as embracing all that is usually understood by surgery *plus* "a study of the surgical diseases, complications, and local conditions peculiar to the tropics." He adds that intermingling of diseases consequent upon more rapid human interchange between tropical and temperate climates will in the near future necessitate a more general knowledge of tropical medicine and surgery.

The subject matter of the paper is considered under several heads. Quotation or comment is restricted to a few of the many points of special interest dealt with.

As a climatic consideration of importance it is recognized that heat is a difficult factor to contend against, harmful to the patient and demoralizing to the surgeon. When the atmospheric temperature is very high a careful watch must be kept in surgical wards for the appearance, often very sudden, of symptoms of heat-stroke. Operative surgery can be practised successfully, if ordinary precautions are adopted, in a tent or temporary hut, but it is satisfactory to learn that the long-neglected question of the cooling of rooms and houses is at last receiving attention.

In discussing rat-bite fever it is laid down that rat-bites should always be excised or thoroughly cauterized. In one curious case seen by the

author the exact site of a rat-bite scar on the little toe developed a melanotic sarcoma within five months.

In countries where plague is endemic or liable to appear in epidemic form the surgeon must always be alive to the possibility of encountering cases of aberrant type. Interesting instances are given.

Schistosomiasis is cited as an example of the extraordinarily unequal distribution of tropical diseases, being unknown at the present time in India owing to the absence of fresh-water snails of the genus *Bullinus* though fossil remains of this snail are found.

From a surgical point of view *Filaria bancrofti* is the most important of the parasitic worms infesting the human body, and the author is of opinion that in some heavily infected localities it provides the surgeon with nearly half his operative work. We have as yet no specific remedy for this worm, and are still very ignorant of some phases of its life history in the human tissues, as well as of many of the details of its pathological manifestations.

Some curious cases are quoted from the author's own experience relating to the surgical depredations of intestinal worms.

In his concluding remarks Sir Frank Connor points out that every aspect of surgery is modified to some extent by tropical conditions varying with climate and locality, conditions of life, racial peculiarities, and other known and unknown factors.

J. J. Pratt.

LE ROY DES BARRES (A.). La chirurgie en Indochine et en particulier au Tonkin. [**Surgery in Indo-China and especially Tongking.**]—*Rev. Méd. et Hyg. Trop.* 1928. Nov.-Dec. Vol. 20. No. 6. pp. 161-178. [13 refs.]

In a paper of considerable length the author treats of surgery, surgical results, and surgical difficulties in the tropics, with special reference to Tongking and Indo-China. Speaking generally, he finds that results are much the same as in temperate climates when operations are performed with all needful precautions in suitable surroundings, by surgeons provided with full necessary equipment and assisted by a trained staff. In the bush, on the other hand, where these conditions cannot obtain, the result depends largely upon chance and the resistance of the subject. The surgeon practising in Indo-China having acquired knowledge of climate, of environment, and of the people with whom he is called upon to deal, learns that the first, by its warm humidity, necessitates special precautions in sterilization, in the care and storing of instruments and dressings, and in the choice of anaesthetics. It moreover lowers his own powers of resistance and produces a liability to cutaneous affections which may at times prevent him from undertaking operations. Skin diseases of every variety are of course extremely common among the natives. The bites of wild and venomous animals produce injuries of a special nature. Tetanus and gangrene are constantly encountered. Malaria, intestinal infections, and untreated syphilis have always to be reckoned with. The multiplicity and variety of insects with their pathogenic capabilities, myiasis, racial and family habits and superstitious ignorance, aversion to surgical intervention, are some of the factors requiring recognition in the surgeon's relations with Annamites. To these may be added beriberi and malnutrition, sometimes bordering on starvation. There is no alcoholism amongst the indigenes, but the

opium habit is widespread. Amongst the Europeans it is by no means rare to find a moderate opium smoker, and though actual drunkenness is uncommon, some degree of over-indulgence in alcohol is frequent. The surgeon often carries on his work with an insufficiency of instruments and appliances, and without the support of the radiologist, bacteriologist, and pathologist whose assistance in more civilized surroundings would be considered indispensable. The idea seems to prevail among European residents, perhaps climate-wearied and debilitated by paludism, dysentery or helminthiasis that surgical intervention on the spot (at any rate outside the capital) should be restricted to cases of urgency, and this view is shared by some of the medical men. The writer is not at present in favour of multiplying surgical centres in Indo-China, but considers it essential that those already existing should be better equipped both in material and personnel.

M. Roy des Barres gives much sound advice with regard to operating rooms and sick wards; the preparation of patients (including the opium addict) for operation; the choice, care, and application of dressings; and the preservation of instruments. As a general anaesthetic he prefers ether to chloroform or chloride of ethyl. He finds that chloroform does not keep well, and is ill tolerated by Europeans often with liver and kidneys not functioning satisfactorily. With natives, for operations below the umbilicus he employs spinal anaesthesia (syncaïne or stovaine), but notes with regret that this method is not in favour with the white man. Local or regional anaesthesia is resorted to whenever possible.

Dressings should not be voluminous and must be changed oftener than in temperate climates. In the post-operative period a careful watch must be kept upon native patients and their companions, owing to their ignorance and indocility in the matter of diet, and to the curiosity which induces them to meddle with the coverings of wounds.

J. J. Pratt.

MANUWA (S. L. A.). **Hernia in the West African Negro. An Analysis of One Hundred Consecutive Cases operated on in Calabar African Hospital.**—*West African Med. Jl.* 1929. Jan. Vol. 2. No. 3. pp. 156-161. [6 refs.]

In West Africa such abdominal operations as are performed are usually infra-umbilical and of these herniotomy is much the most common, the hundred cases reported in this paper representing 88·9 per cent. of all abdominal and 45·7 per cent. of all major operations in a year. Seven of the patients were females and 93 males. 80 per cent. of the total were between the ages of 21 and 40. The most common predisposing factor was increased intra-abdominal pressure resulting from the straining attendant on chronic constipation and gonorrhoeal stricture. In 63 cases signs of chronic gonorrhoea were noted, and in 12 of these almost complete stricture, necessitating dilatation or urethrotomy, was present.

Ninety-six of the hernias were inguinal, one femoral, and three umbilical; of the last-mentioned two occurred in children and were of neo-natal origin, while in the third the subject was an obese multiparous female. Of the inguinal cases eight were enormous scrotal hernias extending down to the knees or further, one was associated with a large elephantiasis of the scrotum, and in eleven the bladder

formed either the whole or part of the contents of the sac. The diagnostic features of hernia of the bladder are detailed.

Five cases in all were strangulated, four inguinal and one umbilical. Two of the former were Richter's hernias (in which complete obstruction and faecal vomiting do not occur).

Pre-operative treatment consisted in dealing with any gonorrhoeal and luetic infection, and in clearing the intestine of helminths with chenopodium. Quinine grains 5 twice daily was given to all patients. Large scrotal hernia patients received a preliminary course of digatilis, haematinic, and anti-specific remedies. Bladder cases were irrigated with acriflavine lotion (1 in 4,000) and put on a hexamine mixture.

The routine anaesthetic in simple cases was the gas-oxygen-ether mixture given by Boyle's apparatus. Spinal anaesthesia was found unsatisfactory and relatively slow.

The usual operation practised was one in which, unlike Bassini's method, the internal oblique and the conjoined tendon were stitched over the cord to the abdominal surface of the inguinal ligament by stout interrupted catgut. In the large scrotal hernias it was sometimes found necessary, by reason of the bulk of the contents of the sac and adhesions, to adopt special methods, which are described.

In hernias of the bladder the best line of approach was found to be from the upper antero-lateral surface just below the internal ring. Partial cystectomy was the routine procedure in all cases in which more than one-third of the bladder protruded.

Post-operative complications were rare in the simple cases, but in one of the large scrotal hernias paralytic ileus, with pre-existing myocarditis, resulted in death; another, with pus in the scrotum, developed diarrhoea and died suddenly ten days after operation; a third case succumbed to amoebic dysentery after four weeks; a fourth, suffering from syphilitic aortitis and myocarditis, survived for ten days only; while a fifth with mitral incompetence and other troubles, died after five weeks, the wound having in the meantime soundly healed. In addition to these, three of the five strangulated cases ended fatally; in one of them the condition had been converted into that of faecal fistula five days before the operation by a "medicine man," who had thrust a knife into the swelling. It is noted that a red-hot poker has been known to be used for the same purpose.

Excluding the fatal strangulated cases and those of inter-current disease, the mortality was 2 per cent. No instance of recurrence of the hernia has yet come to notice.

J. J. Pratt.

BARNARDO (F. A. F.). The Importance of the Recognition of Mixed, Multiple and Secondary Infections in the Treatment of Tropical Diseases.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 1-6.

In the course of two years at the Medical College, Calcutta, 250 cases have been analysed by means of laboratory diagnosis, thus :—

A.	Simple Infections	...	...	...	...	...	40
B.	1. Mixed Infections	...	...	...	...	...	22
	2. Multiple Infections	...	...	...	...	...	88
	3. Secondary Infections	...	...	...	...	...	100

B.1. Mixed infections. One organism enables another to gain a foothold, i.e., to become pathogenic. Instances given are the sudden

virulence of cholera, the inability of the tetanus bacillus to proliferate in the tissues without a friendly coadjutor.

B.2. Multiple Infection. Two infective agents are at work independently, e.g., typhoid with malaria, typhoid with ankylostomes or round worms. Attention is drawn here to the virulence of the streptococci in the tropics and their frequent presence in the blood stream in cases of simple fever.

B.3. Secondary Infections. One infection supervenes on another when resistance has been lowered, e.g., kala azar followed by typhoid and *vice versa*; typhoid followed by streptococcal infection; tuberculosis and malaria; dysentery and general streptococcus infection.

Doubtful cases are then discussed. One factor may be latent or dormant, e.g., colon bacilli in the urine and harmless, plasmodia in the blood but at the time non-pathogenic. In other instances there is antagonism, e.g., malaria and G.P.I.

"It will be remembered that few tropical diseases can cause symptoms and a clinical picture sufficiently pathognomonic to be definitely recognized without the aid of the laboratory, and the closest co-operation of the clinician and pathologist is the only method of safety. On the whole, I am inclined to accept, as a factor, no finding of the laboratory, if it appears that the organism discovered is not likely to have contributed to a part of the clinical picture."

[A contribution to an important and little studied subject.]

A. G. B.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1929. Apr. Vol. 22. No. 6. pp. 819-831 (Sect. of Trop. Dis. & Parasit. pp. 23-35).
—**Discussion on Monkeys and Human Disease** [POCOCK (R. I.), LOVELL (R.), HINDLE (Edward), THOMSON (J. G.), CAMERON (T. W. M.), WIGGLESWORTH (V. B.), HAMERTON (A. E.)].

In this discussion on the relationship of man and the lower primates, from the medical point of view, Pocock considered the zoological relationships of man, apes and monkeys and concluded that the common ancestor of man and the apes was a mainly terrestrial biped and that, whereas the apes readopted more or less arboreal habits—possibly as a result of human competition, man himself progressed along the line of perfecting terrestrial locomotion in the erect bipedal manner. Lovell discussed the bacterial diseases of apes and monkeys in captivity including streptococcal infections of the lungs. From the digestive tract, where they have been the cause of disease, have been recovered *Bact. aertrycke*, *Bact. morgani*, and other organisms related to the dysentery group of bacilli. Monkeys, he pointed out, are susceptible to both mammalian strains of tubercle bacilli. Experimentally they have shown themselves to be susceptible to *Br. melitensis*, *Str. pneumoniae*, meningococcus and various other organisms pathogenic to man. Hindle, considering the filterable viruses, stated that in the wild state rabies was the only disease in this group contracted by monkeys, although he directs attention to BALFOUR'S belief that monkeys might also suffer from yellow fever. As experimental animals, they have proved invaluable in investigations on yellow fever, poliomyelitis and measles; they are the only known alternative hosts to man in the first two of these at least. Thomson showed that virtually all the human protozoa were found in the lower primates but further

work was necessary before all the parasites could be considered specifically identical. Cameron in discussing the helminth parasites, pointed out that *S. mansoni* was the only important human parasite known to be harboured by monkeys, although probably *S. haematobium* would ultimately have to be added to the list. Other parasites common to both, were either unimportant clinically or of merely local importance. The Oxyurids of man and monkeys presented an interesting evolutionary problem. Wigglesworth drew attention to the phylogenetic relationship of the lice in the primates and Hamerton demonstrated a series of specimens illustrating the morbid anatomy of monkeys.

The discussion while emphasizing the importance of monkeys as essential experimental animals showed that—with the exception of the schistosomes and possibly of yellow fever—their effect on human health in the tropics was negligible.

T. W. M. Cameron.

LOWMAN (K. E.). **Health Conditions in St. Croix.**—*Milit. Surgeon.* 1929. Apr. Vol. 64. No. 4. pp. 539–543. With 2 text figs.

This island of 84 sq. miles, sometimes known as Santa Cruz, one of the Virgin Islands lying off Porto Rico, was acquired by the U.S.A. in 1917. It is volcanic and the chief industries are sugar growing and cattle raising for the Porto Rico market. There are 11,118 inhabitants, of whom 500–600 are recent arrivals from Porto Rico. The leper asylum has 84 inmates, most of whom come from other West Indian Islands. At the insane asylum two cases of pellagra are noted. Steps have been taken to control the spread of hookworm from the Porto Ricans to the Santa Cruzians. All positive for hookworm ova have been or are being treated and adequate privies have been constructed for the immigrants. Estate owners have been recommended to instal these necessities in all villages. A mosquito survey has shown the prevalence of *Anopheles albimanus*; it is noted that while the Island is “practically malaria free” the Porto Ricans are in many cases infected. *Culex fatigans* and *Aedes aegypti* breed all over the island, especially near human habitations. Measures have been taken to control all mosquito-borne diseases. Surgical operations at the two hospitals in the last year included “a great number of tonsillectomies.”

[A paper on the Virgin Islands was summarized in this *Bulletin*, Vol. 11, p. 217. It is there noted that hookworm infection is found in St. Croix, but is not widespread. Filariasis was estimated at 25 per cent. or more; pellagra as quite common. Water supply is described as a “knotty problem.”]

A. G. B.

HIGGINS (M. E.). **Health Conditions in the Gendarmerie d’Haiti.**—*U.S. Nav. Med. Bull.* 1928. Oct. Vol. 26. No. 4. pp. 889–893. [2 refs.]

The Haiti gendarmerie is a military police force of 2,500 enlisted men, all of pure African blood, distributed in 140 stations and outposts all over the Republic. The death rates, given for each year from 1923 to 1927, are about three times those of the U.S. Navy, and admission rates about one and a half times as large. These excesses are due to tuberculosis, malaria, and V.D. Of 25 deaths in 1927 11 were due to

tuberculosis, 4 to pneumonia and 4 to heart disease. The necropsy records at the Haitian general hospital Port au Prince, show that one-third of all deaths in that institution are due to tuberculosis; facilities for segregation of cases and early diagnosis are only now available. The inadequacy of the diet in protein and fat is believed to account for the susceptibility of the Haitian to both pneumonia and tuberculosis. As a cause of morbidity in the gendarmerie V.D. head the list, 776 admissions in 1926. Kahn and Wassermann surveys have shown that 62 per cent. are positive; yaws is very common in the rural clinics. Malaria too is common, but no deaths were reported. Infestation with intestinal parasites is usual but is of minor importance; hookworm disease is not a public health problem of any magnitude. The past decade has been one of great progress.

"The National Public Health Service has established 10 hospitals and is operating over 100 dispensaries and clinics, covering the entire Republic. Treponemicidal drugs are being administered at the rate of one-half million doses per year and thousands of cases of malaria are receiving treatment by quinine. The National Agricultural Service, through numerous rural schools, is decreasing illiteracy and increasing the productive capacity of the peasant by the introduction of improved farming methods."

A. G. B.

RISQUEZ (F. A.). La morbosidad en Venezuela. [**Prevailing Diseases in Venezuela.**—*Cronica Med.-Quirurg. de la Habana*. 1929. Apr. Vol. 55. No. 4. pp. 196-205.]

The chief diseases are malaria, parasitism, and tuberculosis in that order; the general mortality rate for the Republic is 23 per thousand, but it varies greatly in different districts. Thus, in the capital, Caracas, at 1,000 metres with a mean annual temperature of 20° C., a progressive population, and no malaria, the figure is 25. The malaria death-rate is 3-4 per thousand, but 20 to 70 per cent. of the inhabitants in certain areas show blood infection. Of parasitic conditions hookworm is the most common. Other fevers include chiefly typhoid, sometimes in association with malaria and yellow fever. Paratyphus infection is common, and a condition denominated "pseudotyphus," which is *Bact. coli* septicaemia. Yellow fever is endemic in Maracaibo where it is called "acclimatization fever." Typhus and relapsing fever also occur. Tuberculosis accounts for between 3,000 and 4,000 deaths annually, and among those registered as dying from bronchopneumonia and bronchitis are undoubtedly many cases of tuberculosis.

H. Harold Scott.

COLLIER (W. A.). Durch Protozoen verursachte Krankheiten im Llanosgebiet Venezuelas. [**Protozoal Diseases in the Llanos Region of Venezuela.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Oct. Vol. 32. No. 10. pp. 489-494. [1 ref.]

The diseases met with on the Orinoco plains about which the author writes [with some latitude as regards his title] are malaria, amoebic and balantidial dysentery, tropical ulcer, dengue, Weil's disease and yellow fever.

Antimosquito measures against malaria are impracticable because for part of the year the plains are a sheet of water; mosquito nets are little

used. Amoebiasis is much rarer in the plains than elsewhere, which the author attributes to the scarcity of flies, itself unexplained. Yellow fever has disappeared but since *A. egypti* is ubiquitous it may return.

A. G. B.

UNITED FRUIT COMPANY, BOSTON, MASS. SEVENTEENTH ANNUAL REPORT. MEDICAL DEPARTMENT. 1928. pp. 25-33. **Comments on Some of the more Important Diseases occurring in the Tropical Divisions.**

In the plantations of the United Fruit Company [as elsewhere in the tropics] while malaria is the chief cause of morbidity, lobar pneumonia provides most fatalities. In 1928 of 368 cases hospitalized 138, or 37.5 per cent. died, a higher percentage than in the two years previous. The incidence and mortality rates are affected by: (1) Race. Native Indian, negro and mixed races are more susceptible than whites. (2) Labour turnover. In some divisions this is high; hence low individual earning capacity, inadequate food and clothing, and lowered resistance to infection. (3) Intercurrent diseases: malaria, hookworm, syphilis, malnutrition cause anaemia with again lowered resistance. (4) Influenza. No specific drugs or measures have given better results than those formerly employed. Early digitalization by heroic doses is recommended.

Epidemics of influenza occurred in 1928; 1,755 cases were treated with 11 deaths.

Of typhoid there were 78 cases treated in hospital with 12 deaths. In no case was the origin traced to water, milk or other food supply. Of 39 cases investigated in the Banes Division in 38 instances the origin was traced to flies or direct contact, in the remaining one to a recently infected well. Measures advised are education, prophylactic inoculations and case isolation. In 1928 8,000 injections of typhoid vaccine were given to contacts.

Of amoebic dysentery 331 cases were treated with 3 deaths; this, a lowered incidence, is attributable to the improved water supply in the Colombia Division. The bismuth-subnitrate treatment, even when uncombined with emetine, is so effective that details are given:—

“The patients were confined to bed, placed on a varied liquid diet (excluding eggs), and bismuth subnitrate was given in doses of from 1 to 2 teaspoonfuls in bulk, stirred in a tumbler of plain water, or—better still—effervescent water, 3 or 4 times daily. This treatment was continued until the stools formed and were lessened in number to 3 or 4 daily, whereupon a more generous diet was allowed. As the patient convalesced, the dosages of bismuth were reduced in number to 2 or 3 daily. If constipation developed and no movement occurred for 2 days, castor oil was administered. Generally, within from 3 to 4 weeks the patients were convalescent, and relapses were of rare occurrence. . . . Within 24 hours after administration the character and the flora of the stools changed, and improvement in the patient's condition soon became evident. Amoebae were rarely found after the 4th day.”

Nowadays emetine is given hypodermically as well, 1-2 grains daily, not more than 9 grains to a course, repeated only after an interval of several days. E.B.I., yatren and stovarsol have been tried but “none has produced the universally good results obtained from bismuth subnitrate and emetine.” Eighty-two cases of bacillary dysentery, of various forms, were treated with 8 deaths.

The incidence of beriberi is increasing; 42 cases. In the classes of people affected there is an excess consumption of refined cereal food and inadequate intake of unrefined foods, as legumes, vegetables and fresh fruit.

Incidence of hookworm infection is high but degree of infestation low. All hospital patients are examined for hookworm and if ova are found, treated. Oil of chenopodium is the vermifuge of choice.

Of diphtheria 17 cases were reported with 2 deaths; it rarely assumes epidemic proportions in the American tropics and seldom proves fatal. A number of persons exposed have positive throat cultures but few become ill.

Of pulmonary tuberculosis 228 cases were treated with 36 deaths. Other topics discussed are erysipelas, venereal diseases and dhobie-itch ointment.

A. G. B.

FLU (P. C.). Verslag van een studiereis naar Suriname (Nederlandsch Guyana) Sept. 1927-Dec. 1927, en beschouwingen dienaangaande. (**Report on Investigations in Surinam (South America), September 1927-December 1927.**)--*Acta Leidensia (Scholae Med. Tropicae)*. 1928. Vol. 3. pp. 1-188. With 61 figs. English summary pp. 189-192.

This is a long Dutch paper freely furnished with good photographs and having an English summary of three pages appended. Here is the summary summarized. The author was born in the Colony and has worked as head of a laboratory at Paramaribo. On this visit he found the public health conditions at the capital improved but water for domestic purposes is stored in "zinc wells" which may breed culex and favour the spread of filariasis (*F. bancrofti*). In 1909-10 he made an extensive examination of the inhabitants of Paramaribo for filarial infection. The actual figures are not given but:

"1.2 per cent. of the whites

25 per cent. of the Israelites

23 per cent. of the socially privileged creols

50 per cent. of the men { of the remaining less privileged

60 per cent. of the women { inhabitants

were infected with the larvae of *Filaria bancrofti*."

Elephantiasis, lymphomata, erysipelatoid inflammation, lymph varices occurred frequently. In 1927 in an examination of 638 culex he found larvae in the muscles or proboscis of 172 or 27 per cent., whereas in 215 stegomyia the number infected was 18 or 8.3 per cent. The author explains this difference by the fact that stegomyia for the first few days after eclosion flies by day, whereas culex from the first is nocturnal; hence culex runs a greater chance of becoming infested by embryos which are found in the peripheral circulation at night. He examined 51 families with 224 persons, living in streets where the mosquitoes were highly infected; of the 51 families 35 were infected; of the 224 individuals 58.

Formerly cases of primary malaria in Paramaribo were very rare. Rice cultivation has now been started round the town. *A. tarsimaculata* breeds there and malaria is frequently found in the outer parts. Other diseases found are leprosy (widespread), enteric, amoebic dysentery (rare), bacillary dysentery (small epidemics). The most important diseases among coolies are ankylostomiasis, malaria, ulcer cruris and venereal disease.

A. G. B.

SCHÜFFNER (W.) & SNYDERS (E. P.). Vorwiegend in den Tropen vorkommende Darm- und Blutkrankheiten. [**Intestinal and Blood Diseases which occur Especially in the Tropics.**—Reprinted from *Verhandlungen d. Gesellsch. f. Verdauungs- u. Stoffwechselkrankh. VIII. Tagung. Amsterdam. 1928, Sept. 12-14.* pp. 135-145. (Leipzig: G. Thieme, Verlag. 1929).]

The authors give a list of diseases which have hitherto spared the Dutch East Indies—trypanosomiasis, leishmaniasis, yellow fever, relapsing fever, typhus, Oroya fever, undulant fever, scarlet fever, schistosomiasis. Eighteen years ago plague might have been added, but at that time it effected an entry into Java and there it remains. A malignant form of scarlet fever lately broke out on a Dutch steamer during its voyage through the tropical zone.

The authors proceed to discuss the diseases found in that part of the world and especially ankylostomiasis and sprue.

A. G. B.

SPARMANN (Richard). Als Arzt in Holländisch-Ostindien. [**Experiences of a Physician in the Dutch East-Indies.**—*Wien. Klin. Woch.* 1929. May 9. Vol. 42. No. 19. pp. 652-658.]

The author is an Austrian surgeon who recounts his experiences after seven years in Java and in northern Sumatra. After a description of the country and the medical and sanitary provision for the numerous coolies he comes to his own observations which are of general interest but contain little that is not familiar to readers of this *Bulletin*. He says emetine in Java has not proved to be the preventive of liver abscess that was expected. He operated on 47 cases of an average content of 5-7 litres of pus [but does not say whether these patients ever received emetine.] He notes that cases of chronic relapsing amoebic dysentery are often relieved of symptoms by removal of the appendix. Illustrating the size of some of the tumours met with he removed a dermoid cyst of the ovary containing 61 litres of fluid. The woman who was parted from it weighed 34 kgm. and returning to her village was nearly excluded as a stranger. He notes the very frequent occurrence of urethral stricture as a result of gonorrhoea and that of rectal stricture after infection with "Bacillus unae."

A. G. B.

KOUWENAAR (W.). De organisatie van den medischen en hygienischen dienst in het cultuurgebied der Oostkust van Sumatra. [**The Organization of the Medical and Hygiene Service in the Agricultural Districts of the East Coast of Sumatra.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. June 10. Vol. 69. No. 6. pp. 591-603. [2 refs.]]

The 'Coolie Regulation' obliges the agricultural companies on the East Coast of Sumatra to provide their indentured native labourers and their families with medical treatment and attendance. This obligation was taken broad mindedly by the companies in their own as well as in the labourers' interest. The native's fear of European medicine and hospital attendance has since long been practically overcome, but the coolie regulation still provides the European employer with a wholesome advantage in this respect.

Centralization of the hospital service has been a very important factor in bringing this up to a high level of efficiency. The hospitals are generally built for about 5 per cent. of the labour forces, i.e., about 2.5 per cent. of the total population of the estates. The normal percentage of absenteeism on account of illness of the labourers is about 2. A sequel of the centralization of the hospital service is the fact that 70-80 per cent. of the patients in hospital suffer from light diseases only. The accommodation for more serious cases may be comparatively limited.

The medical service on the E.C. of Sumatra aims in the first place, at the combating of disease and prophylaxis. The hospital constitutes the centre of the service. Generally one doctor can take care of 6,000-8,000 labourers and their families, with the aid of European assistants and native staff. At present, there are 40 hospitals with 44 doctors. They offer accommodation to 14,250 patients.

Founded by a few of the most important tobacco companies and later kept up by subscriptions of practically all the companies and the government, the Pathological Laboratory at Medan performs all kinds of pathological research, advisory work, preparation of sera and vaccines, etc.

The hygienic care of the estates is very important. Medical inspection of the labour force is held once or twice a year, local inspections sometimes more frequently in view of local epidemics (hookworm disease, malaria, etc.). The inspections are often combined with mass cures (hookworm disease) or vaccinations (smallpox, typhoid). Sanitary inspection of the coolie lines is held, especially in view of latrine systems, refuse incineration (fly destruction). Water supply, a service providing the coolies with hot tea (i.e., harmless drinking water) in the fields, the food problem (the beriberi menace), hygiene of maternity and infancy, are so many objects of medical care.

The regular information about the occurrence of contagious and infectious diseases gathered by the Pathological Laboratory and the obligatory quarantine for immigrant labour protect the country as much as possible against the import and spread of epidemics.

The costs of the medical and sanitary service amount to about 12-15 guilders (i.e., £1- £1 5s.) per labourer per year.

The medical association is the centre of vivid scientific contact between its members, where the steadily evolving problems are the subjects of exchange of thoughts.

W. J. Bais.

SUMATRA. Rapport xiii-xx, 1919-1925, Serdang Doctor Fonds Hospitaal Petoemboekan Oostkust van Sumatra. [**Report XIII-XX, 1919-1925, Serdang Doctor Fonds Hospital, Petoemboekan, Sumatra.**] [In parallel Dutch and English.] By Dr. G. BAERMANN, Geneesheer Directeur van het Serdang Doctor Fonds.—126 pp. With 8 charts on plates (7 folding). Printing by Varekamp & Co., Medan. [n. d.]

This report, which contains numerous tables and charts, deals with the experience of the years 1919-25, on certain plantations of the East Coast of Sumatra. The average number of coolies has diminished from 23,190 to 14,161 (one factor of the decline has been the withdrawal from the scheme of three temporarily affiliated estates). At the beginning of the period the population included some 7,700 women, at the

end rather more than 4,000. The (unstandardized) rate of mortality has declined from 7·8 per 1,000 to 5·1.

The most important hygienic results attained are the following. Ankylostomiasis which, in 1907, affected 150 per 1,000 of the coolie population affected only 1 per 1,000 in 1925.

The morbidity rate from amoebic dysentery has declined from 15 per 1,000 to 0·8 per 1,000. The attack rate from bacillary dysentery has fallen from 10 per 1,000 to 0·07 per 1,000. In 1911 the incidence rate of syphilis was 77 per 1,000, in 1925 8 per 1,000. In 1925 about 15,000 coolies were examined and only five cases of syphilis were detected. Framboesia is also much less prevalent than formerly; 314 cases are recorded in 1919, 125 in 1925. The sickness rate for malaria was at a maximum (12·5 per cent.) in 1920, fell to 7·8 per cent. in the following year and has varied little in the four following years, when the figures were 3·3 per cent., 3·5 per cent., 2·3 per cent., 3·1 per cent. The opinion is expressed that the rate depends on the importation of new coolies from Java. Treatment is largely limited to the employment of quinine. On some estates the destruction of mosquito breeding-places has been attempted, but it would seem that efficient action on these lines is not economically practicable.

[The general results seem to justify the author's favourable conclusions, even if the cynical reader is apt to suspect that the roseate hues in which the contract labour system is painted are a little *too* bright. *Apropos*, it may be noted that the Dutch text does not always convey quite the same meaning as the English translation. In the English version we read that the coolies have "in their simple way" acquired the rudiments of hygiene. The Dutch text says they have acquired this useful knowledge *volens volens*.]

M. Greenwood.

BUXTON (Patrick A.). Further Data relating to Melanesian Populations.

—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Mar. 9. Vol. 22. No. 5. pp. 435–442. [7 refs.] [London School of Hyg. & Trop. Med., London.]

This paper is supplementary to one summarized in the *Bulletin of Hygiene* (Vol. 2. p. 72) on depopulation in Melanesia. Fresh figures are given for the New Hebrides, Torres Islands and Banks Islands, some relating to quite small islands, and tables are set out of sex ratios in certain parts. The author's conclusions are these:—

"In the old days a variety of causes combined to render the life of the individual and of the community fragile; among these were malaria, ankylostomiasis and yaws, all of which were harmful to the individual's health; and a number of customs detailed in my previous publication which can hardly have been good for society. It must be clearly understood that none of these causes, which were operative in the old days, can be mainly responsible for the sudden depopulation of the last century. The practice of abortion has always prevailed, but I agree with BAKER [this *Bulletin*, Vol. 26, p. 416] that it is probably now more common than before, and that it is an expression of the natives' feeling that life is a hopeless struggle.

"Factors which have become effective in the last century or less are numerous; some affect the body, others the mind. Of the diseases it is difficult to get precise knowledge, for depopulation is active even in areas in which the white man seldom ventures. But the interesting work of BAKER in Santo has shown that in the heathen and untouched parts of that

island there are fewer living children than in those parts in which people are in contact with missionaries and other Europeans. The following figures show the number of living children per hundred adult women :—

Sakau.—Christians, 164 ; Heathen, 120.

Rest of Santo.—Christians, 171 ; Heathen, 79.

" These facts appear to me to be of the greatest importance, for they seem to show that much of the depopulation is due to disease and failure to treat disease. They show also that the loss of old customs is not so effective a cause of depopulation as we had supposed, for in the centre of Santo the heathen people are not affected by any European institution ; in spite of this they have fewer living children than the Christians who have abandoned much of the old manner of life and thought.

" Of the possible psychological causes of the depopulation it is extremely difficult to speak clearly or accurately. It was RIVERS who first suggested that Melanesians die out owing to lack of interest in life, rather than to any concrete cause. Most of us who have travelled in Melanesia have accepted this view, but BAKER's statistics have shaken my faith in it."

A. G. B.

LAMBERT (S. M.). **Health Survey of Rotumah**.—*Med. Jl. Australia*. 1929. Jan. 12. Vol. 1. No. 2. pp. 45-50.

Rotumah is an isolated island in the Pacific 500 miles north of Fiji. It is 7 miles long and $\frac{1}{2}$ to 2 miles wide, and has a mixed population of pure Polynesians and 5 per cent. of others. It is a rich island ; the chief crop is the coconut. The vital statistics are unreliable ; the birth rate has varied from 60 to 39 and the death rate from 60 to 28. There is a European medical officer as well as a native medical practitioner and a good road round the island. An accurate census showed the population to be 2,402 [sex distribution not given], of whom 2,020 were medically examined. 377 persons or 18 per cent. were affected with some *eye condition*. This begins in early life with acute conjunctivitis which progresses to a chronic condition causing pterygium, often with connective tissue changes in the lids, corneal ulceration and staphyloma. This Pacific disease, found also in other islands, should be investigated. Of *tuberculosis* there was no unusual amount. 1,363 had *scabies*. Certified *lepers* were 13. 608 showed some sign of *filaria*, i.e., 30 per cent. ; in 423 the epitrochlear gland was enlarged. 164 had elephantiasis of the scrotum, filarial affections of the epididymis or hydrocele, all adult males ; only 20 persons had enlarged legs and 7 enlarged arms. Of 171 persons examined for microfilariae, 49 were positive or 28 per cent. Of 74 persons examined both day and night, 21 had the day blood infected, and 18 the night blood [the condition of the rest is not given]. " No periodicity in Rotuman *filaria* was found." Most of the few mosquitoes seen were *Culex fatigans*, but few were noticed. Of 2,355 persons, 1,962 or 82 per cent. had been vaccinated.

Part of the purpose of the survey was to treat the people for yaws and hookworm, if necessary. All were examined for yaws.

Number of persons examined for yaws infections	...	...	2,355
1. Primary (includes secondary)	...	53 or 2.3 per cent.	
2. Secondary (latent yaws)	...	422 or 17.9 per cent.	
3. Tertiary (painful lesions)	...	720 or 30.6 per cent.	
4. Quarternary (non-painful lesions of adults)	...	379 or 16.1 per cent.	
Total	...	1,574 or 66.8 per cent.	

1,228 were treated [with what drug is not mentioned]. Careful histories were recorded and a negative history was obtained from only 24 persons between the ages of 2 and 16. The author suggests that

"the right line on which to fight yaws in the Pacific islands is to treat all people from 2 to 16, and to treat only those of the others who show lesions [painful] of the tertiary variety, or who ask for treatment. Concentration should be made on infants." Intramuscular injections of sodium bismuth tartrate, made in the hospital, were ineffective. No case of syphilis has ever been diagnosed.

For *hookworm*, all members of households over 2 years in three districts were examined, one plain smear and two specimens by the Willis flotation method.

Number of persons examined	...	...	...	412
Number infected with hookworm	...	...	...	300
Percentage infected	...	...	...	72.8
Number infected with <i>Trichocephalus trichiuris</i>	...	...	...	236
Percentage infected	...	...	...	57.3
Number infected with other parasites	...	...	...	Nil.

Other tables show the infection by age-groups and sex. 2,034 were treated, by carbon tetrachloride. Worms examined from these individuals were all *Necator*. Of 360 dwellings, 285 had latrines; almost all were of the cess-pit type, "poorly covered by board flooring"; almost all permitted the breeding of flies.

A section is devoted to pigs. Of these there are 4,000, "a prolific source of flies which carry the prevalent eye conditions." Europeans settling among natives press for the exclusion of pigs from the villages. They then gradually disappear, which means a loss of fresh meat and vitamins. "Pacific islands which have plenty of pigs have the most enterprising and most disease resisting population" and the author comes down on the side of the pig.

In his conclusions the author suggests a heavy penalty for unreported primary yaws; the disease should be wiped out. Hookworm disease can be controlled by periodic treatments. "Little can be done for filariasis under our present knowledge."

A. G. B.

TRABAUD (J.). Contribution à une meilleure connaissance de quelques maladies dites exotiques observées communément dans le bassin oriental de la Méditerranée. [**Contribution to a Better Knowledge of Some Diseases called Exotic commonly observed in the Eastern Mediterranean Basin.**]*—Rev. Prat. Malad. des Pays Chauds.* 1928. Dec. Year 7. Vol. 8. No. 12. pp. 620–623, 625–628. 1929. Jan. Year 8. Vol. 9. No. 1. pp. 660–663.

The diseases considered in this paper are on the one hand, 3 day fever, Mediterranean dengue and other dengues; on the other, malaria and amoebiasis with intent to bring out manifestations which they share. The author, who has spent 6 years in the Near East and is Professor of Medicine at Damascus, formulates conclusion on the first head, thus: (1) that the term "3 day summer fever" be alone allowed to describe the affection commonly called papataci fever and phlebotomus fever; (2) that the term dengue be reserved for the eruptive and contagious fever commonly seen in the Eastern Mediterranean, especially in Syria and Egypt; (3) that we give up the misleading terminology of "false dengue" to describe those seasonal, non-contagious diseases transmitted by mosquitoes and seen in tropical and subtropical regions; that for these the unequivocal term "seasonal tropical or subtropical mosquito-transmitted fevers" be used for the time being.

[Professor Traubaud's paper does not clarify the knowledge of these fevers for the British practitioner. He would not object to (1). For (2) and (3) whatever the original dengue was, the term is now, in England and U.S.A., universally applied to a fever transmitted by *Aedes egypti* and nothing would be gained by such a change as is here proposed. One hopes that the term "Mediterranean dengue" will disappear from French papers.]

A. G. B.

DCHAPARIDSE (P.). [Zur Frage der Verbreitung, Epidemiologie und zur Bekämpfung tropischer Krankheiten in Abchasien nach den von Expeditionen gesammelten Material im Jahren 1927-28.] **[Distribution, Epidemiology and Prevention of Tropical Diseases in Abkhasia. Results of Expedition of 1927-8.]**—*Nachrichten der Tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 4. pp. 263-279. With 8 text figs. [In Georgian script. German summary pp. 324-325.]

The Abkhasia Institute of Tropical Diseases sent out an expedition in the summer months of 1927 and 1928, which studied villages in the coastal zone (Black Sea), intermediate zone and the hilly regions. Anophelines were met with in each area, especially near the coast. The splenic index lay between 21 and 62.7, the parasitic index between 3.1 and 38.4. The latter reached its maximum between one and five years, and the former between 5 and 10 years. Later the parasitic falls below the splenic index. *A. maculipennis* was widespread, *A. bifurcatus* and *A. plumbeus* less so. Mosquitoes were very numerous in piggeries.

Hookworm incidence lay between 25 and 73 per cent., the intermediate and hilly zones being much more affected than the coastal zone. A series of pellagra cases was met with, forming 0.3 per cent. of all those examined.

[The Abkhasian Soviet Republic represents a part of the former kingdom of Georgia. The actual numbers studied are not given in the German summary.]

A. G. B.

KNOWLES (R.), ACTON (Hugh W.) & GUPTA (B. M. Das). **Puzzles and Fallacies in the Examination of Stained Films in the Tropics.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian J. Med. Res.* 1929. June. Memoir No. 13. 35 pp. With 7 plates (5 coloured). [6 pages of refs.] [Calcutta School of Trop. Med. & Hyg., Calcutta.]

This work, intended primarily for the use of workers in the tropics, will be much appreciated in other countries where the same or similar puzzles frequently present themselves. It is copiously illustrated and the most important of the illustrations are the coloured plates, giving 224 figures of all manner of objects that are met with in the blood film. These figures have their explanation in the accompanying text and are all numbered so as to give easy reference to the description. It will provide a good exercise for even the experienced worker, if he endeavour

to supply his own explanation of the figures before he looks up the true one. And lest this remark might be taken as an aspersion on the faithfulness of the delineation or colour reproduction, we hasten to say that this is not the reason; it is the wideness of the range of objects that will provide a good test of any one's knowledge of the subject. The first two parts of the work, dealing with: (1) errors due to technique; and (2) abnormal blood elements in human blood films, are the most interesting and each of these has several subdivisions. To the worker in the tropics the search for malarial parasites in blood films is of the utmost importance and the advice given on how to avoid mistaking a blood platelet superimposed on a red blood corpuscle for a parasite is well worth bearing in mind. It is, to refuse to diagnose the appearance as parasite, "unless: (1) it focusses with, and not at, a higher level than the margin of the red cell; (2) it has a definite outline and configuration; (3) it shows (with the Romanowsky stains) blue staining cytoplasm and red staining chromatin." But the best of the advice follows this detail, and it is that anything "doubtful" is probably not a parasite. The same might be said of other parasites. The worker who in his days of inexperience has fallen into grievous error may take comfort from these pages by reflecting that he can claim to have erred in good company. This brochure should be assured of a welcome. A work by the authors on similar lines, which would also be welcomed, would be one on the puzzles and fallacies in the examination of films of faeces in both temperate and tropical zones. A useful bibliography accompanies the text.

W. F. Harvey.

NEWHAM (H. B.) & MARTIN (P. H.). **Further Notes on the Sedimentation-Rate of Erythrocytes.**—*Quarterly Jl. Med.* 1928. Oct. Vol. 22. No. 85. pp. 145–152. [10 refs.]

A continuation of the research noticed in this *Bulletin*, Vol. 25, p. 496. The further series of cases consisted of 29, including 7 sprue, 4 kala azar, 6 malaria, and one each of trypanosomiasis and amoebic and bacillary dysentery. For details the paper must be consulted. The conclusions were as follows:—

"1. The results of laevulose tolerance tests do not suggest that any marked derangement of the liver necessarily accompanies rapid sedimentation.

"2. The specific gravity of packed red cells and that of plasma have not been found to show alterations sufficient to account for a great increase in sedimentation-rate.

"3. The relative viscosity of the plasma likewise shows no diminution in bloods showing rapid sedimentation. On the other hand, an increased viscosity of the plasma has been observed in Kala Azar, a disease associated with rapid sedimentation.

"4. The size of the individual red cell, although found to vary within considerable limits, would not appear to be of any great consequence as a factor influencing the sedimentation-rate.

"5. Auto-agglutination seems to have a dominant influence in promoting rapid sedimentation.

"6. The ratio of plasma proteins (albumin to globulin) to each other has been found to be appreciably disturbed in cases of Kala Azar—here a globulin increase is associated with a positive formol-gel test, very rapid sedimentation, and auto-agglutination."

A. G. B.

CLARK (H. C.). **Haemoglobin Surveys in Labor Camps of the Banana Divisions (Mainland of Central America).**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 245-246. [United Fruit Co. Med. Dept., New York.]

Field surveys in 1928, in which a comparison of spleen rate and parasite rate was made, gave a chance to record the haemoglobin index (Tallquist): the 5,501 persons fall into the following groups:—

Individuals with Hb. Index of						Per cent.
30 per cent.	...	...	...	...	...	0.23
40	"	...	...	...	...	0.67
50	"	...	...	...	...	2.9
60	"	.....	...	...	...	18.3
70	"	.....	...	...	...	41.3
80	"	...	...	...	...	29.1
90	"	...	...	...	...	7.4
100	"	...	...	...	...	0.09

It is suggested that their ability to do manual labour is probably below what would seem to be indicated by their haemoglobin rate. The low index is attributed to the following in order of importance: Malaria, malnutrition, intestinal parasites. The rates conform closely to those of a survey of 11,000 adult male Haitian negroes.

A. G. B.

NAIQUE (Ramanata). *Sôbre as modificações provocadas pelas proteínas em alguns elementos figurados do sangue humano. [Modification of the Cellular Elements of the Blood by Protein Injection.]*—*Arquivos da Escola Méd.-Cirúrg. Nova Goa.* 1928. Ser. A. No. 3. pp. 264-326. [5 refs.] French summary pp. 326-327.

The trials were carried out on five groups of individuals who were injected with milk, antidiphtheria serum, their own blood, their own blood haemolysed with distilled water and 5 per cent. peptone, with the production in each group of hyperleucocytosis, lasting 24 to 72 hours, 24 hours to 5 days, 24 to 72 hours, 48 hours and 48 to 96 hours respectively.

W. F. Harvey.

SCHULTZ (Lester J.). **The Use of Buffer Citrate Solution as a Diluent and Preservative for Red Blood Cells.**—*Jl. Lab. & Clin. Med.* 1929. Apr. Vol. 14. No. 7. p. 674. [1 ref.]

The solution has the composition: sod. citrate 20; dibasic pot. phosphate 2; sod. chloride 3; doubly distilled water 1,000, with pH approximately 7.7. Whole blood mixed with this solution in proportions varying from equal parts to 1 in 200 showed no evidence of disintegration or any change in red or white cells. Even after being kept for 8 weeks at room temperature there was no change in pH and blood cell counts still remained the same. For counts of white cells an addition of methylene blue is desirable.

W. F. Harvey.

WRIGHT (Joseph H.). **A Simple Method of obtaining Permanently Stained Preparations to show Reticulocytes in the Blood.**—*Glasgow Med. Jl.* 1929. May. Vol. 111. No. 5. p. 292.

"A drop of saturated aqueous solution of cresyl blue, about one-sixteenth of an inch in diameter, is put on the ear with the broad end of a needle. The

skin is punctured through the drop, and when the mixture is about one-eighth of an inch in diameter films are made on cover-slips in the ordinary way. These are allowed to dry in air for three to four minutes, and are then stained with Leishman."

W. F. Harvey.

LITTLE (C. J. H.). **A Method of taking Blood for Blood Culture.**—*Jl. Roy. Army Med. Corps.* 1929. Apr. Vol. 52. No. 4. pp. 296-299. With 2 text figs.

The apparatus consists of a test tube containing nutrient medium into which projects rubber tubing for attachment of the puncture needle. At the time of use the apparatus, together with the puncture needle and a sterile test tube with wool plug are taken to the bedside of the patient. The rubber tubing is pulled up and the needle is fitted to it; blood is withdrawn into the culture fluid; rubber tubing, needle and wool plug are removed and a new wool plug, taken from the sterile test tube, is placed in position in the culture tube. Flaming of plugs in the manipulations is to be avoided.

W. F. Harvey.

RUGE (Heinrich). Ein einfaches Hilfsmittel zur mikrophotographischen Aufnahme von kleineren Gegenständen bei schwacher Vergrößerung und auffallendem Licht (Doppelspiegel nach Plett). [**A Simple Apparatus for Photomicrography of Small Objects with Incident Light.**]—*Klin. Woch.* 1929. Mar. 5. Vol. 8. No. 10. pp. 454-455. With 7 text figs.

The principle of the apparatus is simply that of double mirrors to produce equal top lighting of the object. This apparatus can be fixed to the stage of any microscope. The mirrors are capable (1) of a rotation on their axes through 0° to 180°, (2) of horizontal angular displacement through 0° to 90° and (3) of a lateral separation amounting to about 10 mm. For ordinary observation daylight or a microscope lamp suffices and for photomicrography 2 light sources at right angles to one another are required.

W. F. Harvey.

HOFSTEE (H. G.). Oriënteerende proeven met den voedingsbodem van Léon Muller voor het faecesonderzoek. [**Experiments with Léon Muller's Medium for Faeces Examination.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Feb. 20. Vol. 69. No. 2. pp. 125-131. [Inst. of Trop. Hyg., Amsterdam.] [5 refs.]

The author tested the value of Léon Muller's tetrathionate medium for its applicability to bacteriological faeces examination in the Tropics.

This medium is made up by mixing: (1) 5 per cent., calc. carbonate in the nutrient bouillon, lemco 1 per cent., peptone 1½ per cent., pot. chloride and di-sod. sulphate each 2½ per mille; (2) 50 per cent. sod. sulphate; and (3) iodine 25; pot. iodide 20; water 100, in the relative proportions 90, 10 and 2 cc. It is used as an enrichment medium prior to plating.

He paid special attention to the growth of organisms of the dysentery group, paratyphoid A and paracoli bacillus. Experimenting with pure cultures, and with the same strains mixed either with coli culture or with faecal emulsions, the results confirmed the selective growth of typhoid and salmonella bacilli in Muller's medium and the inhibiting influence it exercises upon the dysentery bacilli of various types and upon paratyphoid A. Proteus and paracoli bacilli, however, grow

well. After incubation of longer than 24 hours sometimes also the coli bacillus starts to grow. For a complete laboratory diagnosis from faecal material direct plate cultures on Endo agar (or similar media) remain necessary to detect dysentery and paratyphoid bacilli and the exact identification of isolated strains is required to exclude confusion of typhoid with paracoli and proteus. Further research is desirable in regard to possible influence of the medium on the various strains, the practical importance of the solid tetrathionate medium, etc.

W. J. Bais.

BOURGUIGNON (G. C.). Note préliminaire sur la conservation sous les tropiques des souches de meningocoques. [**Preservation of Meningococcus Cultures in the Tropics.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Mar. 31. Vol. 9. No. 1. pp. 59–61. [Bact. Lab., Leopoldville.]

The death of meningococcus in culture, necessitating daily subculture in order to maintain it alive, is attributed to rapid increase of alkalinity and to the presence of too much oxygen. An ascitic fluid medium, containing 0.2 per cent. glucose, and covered with a layer of vaseline has been used for the preservation of gonococci. The glucose by its fermentation retards the increase in alkalinity. This medium has been found by the author equally useful for the preservation of both meningococci and gonococci, which have been kept alive for 37 days without subculture.

W. F. Harvey.

CUNNINGHAM (J.). **A New Technique for handling Infected Monkeys.**—*Indian J. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 1033–1035. With 4 figs. on 2 plates & 1 text fig. [1 ref.]

In the case of diseases transmissible from animals to man special care has to be taken with experiments. Most of the immunization experiments performed upon animals for rabies have been preinfectious and the danger from handling is not one of contraction of the disease during the manipulations. It is otherwise when the experimentation is postinfectious. The author gives here useful details of the precautions to be taken in such a case and illustrations of the procedure. Briefly stated, they consist in the use of special clothing, protection of the hands by gloves, special living cages and, most important of all, a special cage which the animal enters for the inoculation and which leaves the lower part of the chest, the abdomen and the lower limbs available for injection or for withdrawal of venous blood.

W. F. Harvey.

HEINEMANN. Die Luesreaktion von Kadisch im Arbeitskreis des Tropenarztes (mit einigen Bemerkungen ueber die Bedeutung vergleichender Blut- und Liquoruntersuchung). [**Kadisch's Reaction among Labourers in the Tropics.**]—*Muench. Med. Woch.* 1928. July 6. Vol. 75. No. 27. p. 1161. [11 refs.] [Senembah Company's Tandjong Morawa Hosp., East Coast Sumatra.]

The author has recorded in previous papers the difficulty of determining the real significance of a luetic positive reaction of serum in the

tropics. He now records that in recent years a large number of the Javanese labourers have become infected with yaws. Many of these cases even when yaws is latent give a positive serum reaction. There is little yaws in the Chinese labourers, but these often have leprosy. All the inhabitants suffer at some time from malaria, which affects the serum reaction. He has found a positive reaction in malaria cases even when malaria parasites were not detected in the peripheral blood. He has tested a number of serums by the Wassermann reaction, and as well by the flocculation tests of Meinicke and that described by KADISCH in 1926.

Serums of	Wassermann positive.	Meinicke positive.	Kadisch positive.
	Per cent.	Per cent.	Per cent.
162 Manifest lues or yaws	81	84	84
121 Gonorrhea or bubo ...	22	23	23
1,179 Internal or skin symp- tonis	14	13	15
82 Pregnant women ...	15	13	17
181 Surgical cases ...	11	12	06 [<i>sic.</i>]
134 Malaria	16	15	21
81 Cases—clinically (rigor and fever) malaria	30	20	35

The author notes that in malaria cases with positive lues blood serum reaction, the cerebrospinal fluid gives a negative reaction. He comments that this may have a bearing on the question of the therapeutic action of malaria in cases of syphilis with positive reaction in the cerebrospinal fluid.

H. M. Hanschell.

CIARROCCHI (Luigi). La reazione di Meinicke con antigene colorato nella malaria e nella tubercolosi. Considerazioni cliniche. [**The Meinicke Reaction in Malaria and Tuberculosis.**]—*Riforma Med.* 1929. May 4. Vol. 45. No. 18. pp. 600; 603-605. [Dermo-Syph. Clinic, Univ., Rome.]

The author carried out the Wassermann reaction and the Meinicke reaction with ordinary antigen and with coloured antigen according to Borowskaja's method, M.T.R. modification IV, on 100 cases of malaria (8 quartan, 14 benign, 54 subtertian, and 24 chronic malaria) and 7 of mixed malaria and syphilis, and on 156 cases of tuberculosis. The W.R. was positive in 16 of the uncomplicated malaria sera (two each of quartan and benign tertian, three of the chronic malaras, and nine of the subtertian); the ordinary Meinicke was positive in 14, the same as with the W.R., but the quartan cases were all negative; with the modified Meinicke the chronic cases were as before, but only one benign and 7 subtertian gave a positive.

In all the tuberculous subjects the W.R. was negative, but in 8 per cent. the M.T.R. was positive.

H. Harold Scott.

CHOPRA (R. N.), GHOSH (N. N.) & RATNAGIRISWARAN (A. N.).

Medicinal Plants growing in the Himalayas. II.—*Indian Jl. Med. Res.* 1929. Jan. Vol. 16. No. 3. pp. 770-779. [7 refs.] [School of Trop. Med. & Hyg., Calcutta.]

The previous paper was summarized in this *Bulletin*, Vol. 24, p. 233. The authors here deal with plants growing in the mountains which have similar properties to those in the pharmacopoeias and for which they would form substitutes. The plants examined and discussed are *Colchicum luteum*, *Mentha arvensis*, *Juniperus communis*, *Ephedra vulgaris*, *Citrullus colocynthis*, *Berberis asiatica*, *Picrasma quassioides*, *Swertia chirata*, and Aconite.

A. G. B.

CHOPRA (R. N.) & GHOSH (Sudhamoy). ***Terminalia arjuna*: its Chemistry, Pharmacology and Therapeutic Action.**—*Indian Med. Gaz.* 1929. Feb. Vol. 64. No. 2. pp. 70-73. [2 refs.] [Calcutta School of Trop. Med. & Hyg., Calcutta.]

The bark of *Terminalia arjuna*, which is widely distributed, is regarded in India as a cardiac tonic and a liquid extract of it is on the market in Calcutta. The authors therefore took up its study as a part of the Indigenous Drugs Inquiry. Their analysis of the bark did not reveal the presence of any active principles of the nature of alkaloid, glucoside or essential oil. Different fractions obtained in the course of analysis from the bark were found not to have any marked physiological activity. Moreover, an alcoholic extract tried on a number of patients suffering from cardiac decompensation did not show any appreciable effects.

A. G. B.

CRUIKSHANK (A. G.). **Idiosyncrasy to Quinine Injections.** [Memoranda.]—*Brit. Med. Jl.* 1929. Jan. 19. p. 104.

A woman of 65 years, with varicose veins, received an injection of 1 cc. of quinine and urethane solution containing 0.13 gm. quinine. She began to cough and five minutes later collapsed, falling to the floor. She was extremely cyanosed and complained of inability to breathe and sense of constriction in the chest. The pulse was irregular and could hardly be felt. She gradually recovered and then stated that 24 years previously she had taken quinine by the mouth, and suffered from breathlessness, and was advised not to take it again. She returned home next morning. Ten days later a cutaneous test was made. One drop of a 1 per cent. solution of quinine hydrochloride was placed on the forearm and the skin under it scarified. Ten minutes later a definite wheal, surrounded by erythema, was seen. A control of sterile water showed only slight redness. A similar test on the author's arm gave no reaction. When there is reason to suspect idiosyncrasy to quinine this simple test should be employed.

A. G. B.

GRAY (St. George B. Delisle). **Idiosyncrasy to Quinine Injections.** [Memoranda.]—*Brit. Med. Jl.* 1929. Feb. 2. p. 200.

The author describes a similar experience, a woman of 58 years into whose vein he injected 1 cc. of quinine urethane solution for varicosity. She became cyanosed, pulseless, with pupils widely dilated and rattle in throat. On regaining consciousness she vomited. The dermal test was done as in CRUIKSHANK's case with the same results and the author intends to apply it to all newcomers who cannot give assurance that they are able to take quinine without ill effects.

A. G. B.

HUSAIN (Mohd. Ajmal). **Quinine Abscesses.**—*Indian Med. Gaz.* 1929. June. Vol. 64. No. 6. p. 330.

The case of a Bengalee woman of 40, who 14 years after injections of quinine into the buttock developed an abscess there; "necrotic tissue mixed with pus was scraped away embedded deeply in the substance of the gluteus maximus." No inconvenience was felt in the interval.

A. G. B.

BIESIN (A.). Vergiftungsgefahr und Idiosynkrasie bei Darreichung von Oleum chenopodii. [**Risk of Poisoning and Idiosyncrasy in the Administration of Oleum Chenopodii.**]—*Muench. Med. Woch.* 1929. Apr. 19. Vol. 76. No. 16. pp. 661-664. [24 refs.] [Armitstead Children's Hosp., Riga, Latvia.]

The author has collected from published papers 41 cases of poisoning and 30 deaths from oil of chenopodium. Analysing the causes he finds them to be: (1) Overdose of the oil; a usual dose is 3 cc., but not more than 1.2 cc. should be given at one time; (2) unsuitable preparation and way of administration; (3) course too long continued; (4) omission of a purgative. He refers with approval to BRUNING's rules [see this *Bulletin*, Vol. 21, p. 193]. Several case histories are given. The author thinks that owing to the risk of unforeseen and unforeseeable idiosyncrasy the use of the oil should be given up till we possess a less dangerous preparation.

A. G. B.

MITRA (A. C.). **Toxic Symptoms following Administration of Carbon Tetrachloride.**—*Indian Med. Gaz.* 1928. Nov. Vol. 63. No. 11. p. 637.

One hour after taking carbon tetrachloride a patient felt nausea and in a few minutes commenced vomiting. He was seized soon after by colicky pains in the abdomen. Twenty minutes later urticarial eruptions which soon became confluent appeared on the body. The condition had completely subsided the same evening. In an editorial footnote Dr. MAPLESTONE's suggestion is cited to the effect that the symptoms might have been due to *Ascaris* toxin.

R. T. Leiper.

CAWSTON (F. G.). **Emetine Poisoning.**—*Jl. Trop. Med. & Hyg.* 1929. Jan. 15. Vol. 32. No. 2. pp. 22-24.

The author reminds us that the immediate toxic effects of emetine are less dangerous than those due to its cumulative action, and suggests that the daily dose should be replaced by a larger one on alternate days to enable the earliest sign of accumulation to be recognized. He finds the curative dose for schistosomiasis to be just double that required for amoebic dysentery. The maximum total dosage is one grain for each year up to the age of 20. Towards the end of a course of these relatively large doses albumin sometimes appears in the urine; this is a danger signal. The earliest sign of paralysis is an increase in the pulse rate from irritation of the nerve-endings in the heart muscle. In dysentery emetine should be given orally and intramuscularly at the same time; he doubts the necessity of intravenous administration. He finds that if sulphate of soda treatment is given over a period of five days less emetine is needed.

A. G. B.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1929. Feb. Vol. 22. No. 4. pp. 559-568 (Sect. of Therap. & Pharm., with the Sect. of Trop. Dis. & Parasit. pp. 1-10). [12 refs.] **Discussion on the Special Uses of Antimony** [CHRISTOPHERSON (J. B.), GUNN (J. A.), LOW (G. Carmichael), MANSON-BAHR (P. H.), CASTELLANI (Aldo) & HARKNESS (A. H.)].

In this discussion Christopherson treated the subject historically, Gunn chemically, and the other speakers from the clinical side. The discussion is not one for summary.

A. G. B.

BAUER (Hugo) & BECKER (Johanna). Untersuchungen ueber Verbindungen aus dem Gebiete des "Germanins" (Bayer 205). [**Researches on Substances related to "Germanin" (Bayer 205).**]—*Arb. a. d. Staatsinst. f. Exp. Ther. u. d. Georg Speyer-Hause zu Frankfurt a.M.* 1928. No. 21. pp. 10-25. [8 refs.] ["Georg-Speyer" House, Frankfurt a.M.]

The object of this paper is to summarize briefly the history of the research begun in 1904, which led to the production in 1920 of "Bayer 205," now known as "Germanin." As is now well known, the constitution of the new drug was not disclosed and the French chemist, FOURNEAU, and his colleagues produced independently in 1924 the rival drug known as "Fourneau 309," which, the authors admit is identical with "Germanin." The French chemists at the same time pointed out that even very slight modifications in the chemical structure of this drug led to loss of activity, and a large part of the present paper is occupied by chemical formulae representing the modifications tried by the German workers. The results of biological tests with these modifications confirm FOURNEAU's statement. Similarly, attempts to reinforce the activity by the insertion of arsenic acid residues failed. The drug is at present peculiar among purely synthetic drugs in its high therapeutic index (1-240) and in being insusceptible of modification without serious loss of therapeutic efficiency. The authors refer to Emil FISCHER's lock and key analogy in regard to the specific action of enzymes to illustrate this point and suggest that the drug possibly resembles the anti-bodies produced by living organisms.

T. A. Henry.

PETZETAKIS. Considérations cliniques sur la splénomégalie égyptienne. —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1928. July 26. Year 44. 3rd Ser. Vol. 52. No. 26. pp. 1290-1292. [2 refs.]
— **La pathogénie de la splénomégalie égyptienne.** [**The Pathology of Egyptian Splenomegaly.**]—*Rev. Méd. et Hyg. Trop.* 1929. Jan.-Feb. Vol. 21. No. 1. pp. 25-29. With 1 text fig. [4 refs.]

The splenomegalies of Egypt are habitually called Banti's disease or malarial splenomegaly. This is erroneous. They are not malarial nor are they leishmanial. They begin insidiously, sometimes with fever and chills. Fever, however, soon disappears. Progressive cachexia follows and when the patient presents himself the spleen is already large and often the liver as well, though to a less degree. In some instances the spleen fills the belly. There is no pain referred to this organ, only a complaint of lack of strength. The mucous membranes are pale but

there is no marked loss of flesh. The red cells vary between 2 and 3 millions and there is leucopenia of 2,000–4,000. In persons over 30 there may be ascites, but never in young subjects in spite of the size of the spleen. There is sometimes bronchitis and sometimes haemoptysis. Anaemia may be followed by diarrhoea and towards the end there may be haematemesis or bloody stools. Death is slow but sure in patients between 6 and 18 years, the course being the shorter the younger the victim. The disease is rarely seen in persons over 30. Medicinal treatment is without effect; splenectomy is the treatment of choice. In 6 out of 8 spleens removed, the author has found certain corpuscles in smears stained by Giemsa (described below). They are generally round and stained pale blue and are about half a red cell in diameter. At one of the poles is a red point; the rest of the protoplasm seems filled with small bodies in the form of fine rods stained deep blue. Petzetakis suggests that these are protozoal.

A. G. B.

PETZETAKIS (M.) & PAPADOPOULOU (J.). Sur la nature de la splénomégalie égyptienne. [**The Nature of Egyptian Splenomegaly.**]—*C.R. Soc. Biol.* 1928. Vol. 99. No. 38. pp. 1896–1897. [1 ref.]

In the last year the authors have examined 8 cases of splenomegaly, all but one in natives of Alexandria of the poor class. In six spleens puncture was done, in the others the spleens were removed. Smears were examined and sown on various media. Neither *Leishmania* nor *Plasmodium* were discovered and the cultures were negative in 6 cases. In one case a spirochaete developed, in the other a fungus, which however, had no clear pathogenic effect on small animals. Six times out of eight, however, certain corpuscles were seen of the nature of which the author is doubtful. Usually rare, they are chiefly extra-cellular, and appear as irregularly circular bodies, stained pale blue. At one of the poles there is sometimes a red dot of variable form and size, and the rest of the protoplasm, stained pale blue, appears to be sometimes filled with small corpuscles consisting of fine rods stained very deep blue, almost black (length equal to half an erythrocyte). The authors think the mycotic nature of splenomegaly to be very doubtful and suggests that the body which they describe is an unknown protozoon.

A. G. B.

VALENZUELA (A. J.) Notes sur la signification des splénomégalias dans les pays chauds. [**The Splenomegalies of Hot Countries.**]—*Bruxelles-Méd.* 1929. June 30. Vol. 9. No. 35. pp. 990–994. [26 refs.]

The author has observed some 5,000 cases of malaria at the general hospital at Guayaquil, Ecuador, and in private practice. *P. falciparum* was found by itself in 50 per cent. of these cases and associated with another species in 10 per cent., *P. vivax* in 22 per cent., *P. malariae* in 6 per cent. and the last two in association in 4 per cent. Of cases of splenomegaly observed [the actual numbers are not given], 74 per cent. were malarial and disappeared with quinine treatment and 8 per cent. were reduced by quinine treatment; 12 per cent. were syphilitic; 4 per cent. were ascribed to tuberculosis, abscess or leucaemia, and 2 per cent.

were of undetermined origin. Thus two-thirds of the non-malarial splenomegalies were syphilitic; in 64 of these cases there were no signs or symptoms and the diagnosis was made by the finding of a positive W.R. in the cerebrospinal fluid.

A. G. B.

TARDIEU. Anémie splénique et splénomégalie tropicale en Annam. [**Splenic Anaemia and Tropical Splenomegaly in Annam.**]—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 99–108. With 10 plates (2 coloured). [9 refs.]

The author here gives an account of a successful method of treatment of the condition named in the title, currently known as "malarial splenomegaly," which has been practised by Dr. NORMET. A citrate solution is employed, made up on the following formula and called citrase:—

citrate of soda	...	...	...	...	52 gm.
citrate of magnesia	...	...	...	...	10 gm.
tartrate of iron and potassium	...	...	...	...	3 gm.
citrate of manganese	...	...	...	...	0.005 gm.
distilled water	...	...	...	...	1000 cc.

The patient receives in a vein daily one-eighth cc. per kilo for 12 days, followed by a rest of 15 days. The series is repeated till benefit accrues. Some patients have received 20 series in the course of a year. The action is continued after the treatment, which provokes a myeloid reaction of the spleen. Most had had a preliminary course of quinine whether malaria parasites were detected or not, but two of those reported had no treatment other than citrase. The author does not think that malaria plays a part in the etiology.

The hypertrophy of the spleen varies; the large diameter may be 15 cm. or as much as 45. There is frequently ptosis so that when the spleen regains its normal volume its edge is below the chondral margin. Hepatic hypertrophy has been noted in 6 out of 15 patients, the edge being 2–4 fingers' breadths below the false ribs. In 3 of the 15 there was a subicteric tinge of the mucosa and skin. Circulatory troubles are evidenced by oedema of the lower limbs and slight ascites. Anaemia is usually severe. One patient had less than a million r.b.cs.; 7 less than 2 millions. Haemoglobin is likewise diminished, but in less degree. The kidney is spared. There is loss of flesh and parchment skin. The disease is clearly differentiated from Banti's disease, and from the splenomegalies of syphilis and tuberculosis. Leishmania has not been found.

No complete account of the pathology can be given because all the patients have recovered or are tending to recovery. Information has been obtained, however, by frequent splenic puncture which the author finds to be quite free from risk. In all cases before treatment, two kinds of abnormal cell have been obtained: plasma cells and polykaryocytes. The plasma cells have their nucleus excentric, basophil protoplasm and a clear area round the nucleus. The polykaryocytes resemble plasma cells, but are multinucleated. In some cases Rieder's cells have been found. The leucocyte formula varies in each patient from one puncture to another.

From the first injection of citrase the spleen begins to present a myeloid reaction; there appear erythroblasts in karyokinesis,

megaloblasts, and polychromatophilic and orthochromatic normoblasts. As improvement goes on, the plasma cells and polykaryocytes disappear, and then the cells of the red series. The cells named are pictured in two plates. As the cytological conditions change the splenomegaly lessens, and in some patients the spleen has returned to normal. Many patients have resumed an active life. The anaemia improves; the circulatory symptoms disappear; weight is put on. A table shows the chief changes induced by treatment in the 15 patients.

A. G. B.

GORDON (A. Knyvett). **The Rôle of the Spleen in the Causation of Haemorrhage.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Jan. 30. Vol. 22. No. 4. pp. 309-323. With 1 coloured plate. [16 refs.]

The condition of haemorrhage associated with a deficiency of platelets in the blood—essential thrombocytopenia purpura haemorrhagica—is completely cured in most cases by removal of the spleen; the platelet count returning to its normal value of somewhere in the neighbourhood of quarter of a million per cmm. The author found in two cases during operation that the number of platelets in the splenic vein was “much smaller” than that in the artery, which would seem to indicate that the spleen destroys platelets. There is other confirmatory evidence of this activity, e.g., antiplatelet serum injected into a guineapig will produce purpura and thrombocytopenia, but not in splenectomized animals. It is hardly necessary to add that other explanations of the facts are forthcoming; e.g., that purpura is due not to *increased* destruction—which, indeed, is not accounted for in purpura, even if we admit that there is a normal destruction on the part of the spleen—but to diminished production of platelets presumably on the part of the megakaryocytes. We may note here incidentally that the function of the platelets as a factor in thrombosis following parturition, fractures and acute fevers—in all of which conditions there is a thrombocytosis—has been much elucidated by Howel EVANS (1929).* In other haemorrhages than purpura we have other factors than platelets. Thus in septicaemia the altered state of the blood is indicated by increased coagulation time, whereas this is not affected in purpura, though the bleeding time is increased; in haemolytic jaundice the fragility of the red cells is increased, an increase so definite as to be readily estimated by salt solutions of varying strengths; in the splenic anaemias there is an associated leucopenia. [Apart from its intrinsic value as a contribution to our knowledge of spontaneous haemorrhage and the functions of the spleen, this paper shows the importance of simple observations like that of a platelet count. It will be admitted that our knowledge of the blood in many tropical diseases is still very defective. Not only would the usual red cell and leucocyte counts and haemoglobin estimations be made to yield more information by improved methods and by continuity of observations, but we require to fill in the gaps in our knowledge in regard to such matters as platelets, bleeding time, coagulation time, viscosity, refractivity, sedimentation rate, etc., not to mention chemical composition of the plasma.]

J. W. W. Stephens.

* *Vide* “Discussion on Post-Operative Thrombosis.” *Proc. Roy. Soc. Med.* 1929. Mar. Vol. 22. No. 5. pp. 729-733.

GRÉGOIRE (Raymond) & EMILE-WEIL (P.). Des gastrorragies au cours des splénomégaties chroniques primitives. [**Gastric Haemorrhage in the Course of Primary Chronic Splenomegaly.**]—*Presse. Méd.* 1929. Mar. 23. Vol. 37. No. 24. pp. 385-387. [4 refs.]

Sudden haematemesis in a healthy person suggests disease of the stomach but it may equally well result, the authors point out, from a lesion of the liver or, especially, the spleen. Some of the primary chronic splenomegalies are of known origin—malarial, bilharzial, leishmanial, tuberculous; others cannot be classed; but in all of them sudden abundant haematemesis may occur. Four observations are given, of bilharzial splenomegaly, "plasmodial splenomegaly of undetermined cause," splenomegaly of undetermined cause, haematemesis in the course of a probably tuberculous splenomegaly; three of the patients were cured by splenectomy. Stomach bleeding is particularly common in the splenomegaly accompanied by Gandy-Gamna nodules.

A. G. B.

MELENEY (Henry Edmund). **A Case of Splenomegaly showing Paratyphoid Bacilli.**—*Amer. Jl. Trop. Med.* 1929. Mar. Vol. 9. No. 2. pp. 97-104. [15 refs.] [Peking Union Med. College, Peking, & School of Med., Vanderbilt Univ., Nashville, Tenn.]

The author refers to the collection of diseases included under the name "tropical febrile splenomegaly." Details are given of the case of a Chinese male with large spleen, fever, night sweats and ascites. The Wassermann test was negative, the faeces showed cysts of *Entamoeba histolytica*, and the sputum showed no tubercle bacilli. A splenectomy was performed and a paratyphoid C bacillus recovered from the organ in the laboratory. At no time thereafter was it possible to obtain cultures of this organism from the ascitic fluid, blood or stools of the patient, while the tests of the patient's serum for agglutinins against the organism were uniformly negative.

W. F. Harvey.

NANTA (A.). Les ulcères de jambe des splénomégatiques. [**Ulcer of the Leg and Splenomegaly.**]—*Rev. Prat. Malad. des Pays Chauds.* 1928. Dec. Year 7. Vol. 8. No. 12. pp. 587-590, 593-594.

In 1926 the author drew attention to the frequent occurrence of ulcer of the leg in Algerian splenomegaly. Such an association has been described in splenomegaly from Egypt, congenital haemolytic icterus and in sickle anaemia. In the Algerian cases the ulcer is deep, indolent, irregular with purplish, raised, atonic margin. It is the size of a one franc piece or is larger and it may surround the limb. The usual site is the outer side of the leg above the ankle. Round the lesion is an indurated, strongly pigmented area. The ulcer may persist for years; it is commonest in subjects between 12 and 18 years. The W.R. is positive. This and other features suggest syphilis, but treatment is ineffective and the histology is different. In two observations the ulcer healed when the spleen was removed and the author says that he produced an ulcer in a guinea-pig by the injection of a fragment of such a spleen. Leg ulcers are not the only manifestations; there are also urticarial lesions, melanoderma, furuncular nodules, large cicatrices of ulcers of the trunk.

As to the nature of the splenomegaly, he refers to the Brazilian form described by SRONG and others [see this *Bulletin*, Vol. 24, p. 325]. Recently he has found aspergillar filaments in these spleens, but whether the mycotic infection is primary or not he is unable to say; most of the spleens were infected also with microbes. It is possible, he thinks, that some of the ulcers are aspergillar in origin. The association of ulcer and splenomegaly deserves careful study.

A. G. B.

DHRUV (J. Durlabh). **A Note on Traumatic Rupture of the Spleen.**—*Lancet*. 1929. Jan. 12. pp. 72–73.

The author in his hospital practice in Bombay has removed nine ruptured spleens in the course of two years. The incidence of this accident in the tropics is high, this being generally ascribed to the prevalence of malaria and other tropical fevers, but in more than one of the nine cases the organ was small and of normal consistency and malarial changes could not be demonstrated. The possibility of rupture must be considered in all such injuries as falls from a height, railway and car accidents, etc., and in these cases careful examination of the abdomen is held to be imperative. The symptoms to which the writer attaches most importance are thirst, and pain and tenderness in the left hypochondriac region. The pulse he considers of little or no use as a guide, and deprecates waiting for a "haemorrhagic pulse" before arriving at a diagnosis. Restlessness is usually though not invariably present. Dullness as a physical sign of value is much overrated; and rigidity is held to be rather a contraindication to rupture, being dependent chiefly on trauma of the parietal peritoneum.

Before operation diagnosis is confirmed by the insertion of a wide-mouthed needle into the peritoneal cavity. Though sometimes as many as three punctures were necessary the author has always found blood.

The technique of the operation is simply described. A long left paramedian incision is employed. The effused blood, which in this injury does not coagulate, is collected in a sterile bowl with warm saline and "injected straight into the vein of the patient." Removal in the majority of the cases was found easy. The possibility of injury to other organs should be excluded before the abdomen is closed. The risk of including the tail of the pancreas in the structures included in the ligatured pedicle is thought to be greatly exaggerated.

Results have been encouraging, five out of the nine cases recovering. Excision is held to be the best treatment and suturing of the lacerated organ is not advised. Early diagnosis is essential. It is noted that when the rupture is associated with a dilated stomach a fatal termination is usual.

J. J. Pratt.

BOSE (A. N.) & BANERJI (B. N.). **An Investigation into the Cause of Ascites.**—*Indian Jl. Med. Res.* 1929. Jan. Vol. 16. No. 3. pp. 664–674. [13 refs.] [Prince of Wales Med. College, Patna.]

Ascites in India is usually diagnosed as hepatic, renal, cardiac or tuberculous. CUNNINGHAM (1917) noticed the occurrence of ascites and hepatic cirrhosis as a complication of dysentery and MEGAW has

reported a number of cases as due to chronic peritonitis of dysenteric origin [this *Bulletin*, Vol. 19, p. 40; Vol. 21, p. 688]. The authors studied all cases of ascites admitted to hospital at Patna from August 1927 to February, 1928, 35 in all. Of these 16 which were obviously of cardiac, renal or hepatic origin were disregarded, leaving 19 for systematic examination. These were in male Hindus or Mohamedans; 15 gave a history of dysentery or diarrhoea recently or within 2 or 3 years; 12 had had malaria or kala azar and 12 gave a history of typhoid.

The onset is insidious with gastro-intestinal disturbance and debility; swelling of the abdomen is gradual and progressive with intermissions. The fluid becomes excessive in 3-5 months. The patient is then emaciated with dryness and loss of elasticity of skin. Anaemia not marked. No jaundice. No haematemesis or melaena. Fever usually absent. Oedema of feet and legs supervenes, disappearing when the ascites is tapped. The patients stand repeated tapplings well. Their ultimate fate is unknown.

The authors investigated the efficiency of the renal, cardiac and hepatic systems and studied the blood and ascitic fluid. The tests for renal and cardiac efficiency showed no notable loss. The laevulose tolerance test and Widal's haemoclastic crisis test showed that the majority suffered from impaired function of the liver. The results of blood examination are tabulated. In 5 cases of 16 the spleen was enlarged from palpability to 3 inches below the costal margin; three of these patients were positive to both the formol-gel and urea-stibamine test as were two other cases without splenic enlargement. These reactions are regarded by the authors as diagnostic of kala azar. Seven of the 19 gave agglutination reactions with *Bact. typhosum* and *para-typhosum* A and B, and 16 of the 19 gave a positive reaction to dysentery organisms of the Flexner type (from 1:80 to 1:20). Except in one case the ascitic fluid had a low specific gravity, was clear and did not clot, showing it to be a transudate. Its injection was innocuous to guineapigs and no growth was produced on culture; it was therefore non-tuberculous and sterile. The authors discuss the relation of this condition to kala azar, and note that the five cases had all had previous dysentery. As to the rest, they consider that they have established a definite relationship with bacillary dysentery.

"In the absence of sufficient evidence in favour of cirrhosis of the liver, tuberculosis and inflammation as aetiological factors, a mechanical origin of the fluid due to disturbance of the absorptive power of the upper part of the peritoneum caused by previous dysenteric infection, seems probable."

A. G. B.

DONNISON (C. P.). **A Case of Recurrent Ascites.**—*Kenya & East African Med. Jl.* 1928. Oct. Vol. 5. No. 7. pp. 243-246. [2 refs.]

Cases of ascites of uncertain origin are not rare amongst natives of Kenya. As a rule they are mild and do not cause much disability. The case reported presents unusual features.

A Kisii woman, aged about 20, was admitted to hospital in February, 1926, with a history of abdominal swelling for 9 months, again from May-September and in October. She was tapped from time to time, till in December the paracentesis had to be repeated every 2 or 3 weeks. After

tapping, a moderately enlarged spleen could be felt and the liver was just palpable. No fever in hospital. No blood parasites found. *Taenia* and *Trichocephalus* were present but no evidence of *Schistosoma*. A differential leucocyte count revealed eosinophilia of 44 per cent. On December 22nd, the operation of epiploxy was carried out. An enlarged spleen was seen with copious dense adhesions round it. The surface, where it was visible, had a thickened capsule with grayish white thickened patches. The liver was surrounded with copious adhesions. The omentum was partly adherent to the liver, slightly thickened and contracted. The peritoneum appeared normal. Recovery from the operation was uneventful. Fluid slowly reaccumulated up to a point but tapping was unnecessary and has not been resumed. In February, 1928 she declared herself well: no sign of fluid could be elicited; the spleen was moderately enlarged. The author states, without giving figures, that cases of *Schistosoma* infection in the Kisii district are very rare. He draws attention to the success, in this case, of epiploxy.

A. G. B.

NIGAM (K. S.). **Surgery for the Relief and Cure of Endemic Ascites.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 244–250.

The author premises that endemic ascites exists in the tropics as a definite disease absolutely distinct from ascites due to ordinary well-known causes. It is characterized by a collection of free fluid in the peritoneal cavity, progressive emaciation, and a lingering course eventuating usually in death. Its marked prevalence in all parts of India and the continued reticence of medical writers with regard to it, induce him to bring the affection and the possibility of its successful surgical treatment to notice.

Both sexes and all ages, castes, and occupations are affected, the most common age being 35 to 40, and rustics rather than dwellers in towns providing the larger number of sufferers. In all cases there is a slow fibrosis of the peritoneum involving mainly the lining of the liver, spleen, and upper half of the abdominal cavity. The unknown causative factor of this may be a toxin circulating in the blood, or an organism too elusive to control in cultures. In some instances there is a history of antecedent gastro-intestinal trouble, and MEGAW is said to regard the disease as a "chronic bacillary (dysenteric) peritonitis," brought about by absorption of pent up toxins consequent upon ill-advised astringent treatment in dysentery. The fluid is of the nature of a transudate, alkaline in reaction, of a specific gravity of 1003–5, containing about 0.2 per cent. of albumin. The degenerated and fibrosed peritoneum filters this off from the engorged extra-peritoneal capillaries, while it loses its absorbing power. Hence the distended abdomen, wasted limbs, thirst, toxæmia, and general asthenia met with in a typical case.

The writer is of opinion that in early cases when palliative treatment after reasonable trial—say for a period of six weeks—produces no improvement an operation for establishing peritoneal drainage may be undertaken with every prospect of success. In advanced and markedly toxæmic cases no brilliant results can follow any operation.

The objects of treatment are: (1) to diminish the outpouring of peritoneal fluid; and (2) to provide ample drainage of the fluid back to the body tissues. Attainment of the first of these aims can hardly

be hoped for in the absence of definite aetiological knowledge, but a mixed vaccine prepared from the intestinal flora of five patients has been used with brilliant results in one case.

After reference to various methods of surgical relief in ascites Captain Nigam describes an operation of his own by means of which a large drainage tube fashioned from the patient's own tissues is inserted into the peritoneal cavity and anchored there. A strip of fascia lata, at least 12 ins. by 3 ins. is dissected up from the outer aspect of one thigh, remaining pedicled at its upper end, is converted into a tube by lateral suturing over a temporary mould formed by a rubber drain one inch in diameter, and is provided with drainage apertures at the sides. The incision in the thigh is closed, the abdomen opened by an infra-umbilical para-median incision, and the fascial tube (which has in the meantime been lying enveloped in moist gauze) is picked up and pulled into the wound through a tunnel formed in the subcutaneous tissue of the abdominal wall commencing at the upper part of the thigh incision at the anterior superior iliac spine. The inner end of the tube is then slit in tri-radiate fashion, the lips thus formed anchored widely apart by chromic gut sutures, and its wall fixed by interrupted stitches to the posterior aspect of the anterior abdominal parietes, thus obviating any risk of subsequent intestinal strangulation. The peritoneal cavity is drained for five to six days by a fine rubber tube fixed in the lower part of the wound. Healing takes place in about ten days. The procedure may be repeated on the other thigh a month later if necessary.

Seven out of eight cases treated by this method were discharged relieved of their symptoms. One died of exhaustion.

J. J. Pratt.

BERTWISTLE (A. P.) & GREGG (A. L.). **Elephantiasis**.—*Brit. Jl. Surgery*. 1928. Vol. 16. No. 62. pp. 267–282. With figs. 236–246. [34 refs.]

A scholarly and interesting paper which must be studied in the original to be appreciated at its full value. The authors open with a brief reference to the history of elephantiasis, passing on to the various definitions of the disease put forth at times by different authorities, and propounding their own to the effect that the condition is one of hypertrophy and hyperplasia of the skin and subcutaneous tissue, formed in a part suffering from lymphatic and probably venous obstruction, as a result of bacterial infection, usually streptococcal. They note the necessity of distinguishing elephantiasis from lymphatic oedema in which there is no hypertrophy, but merely a distension of the cells and spaces. Next considering the question of bacteriology they conclude that cocci are probably borne from time to time to settle in the "locus resistentie minor" caused by haemic or lymphatic circulatory disturbance, the focus of origin being a local wound or ulcer or some such distant site as the teeth. The recurrence of the condition in the same spot is explained by analogy with erysipelas which renders both individual and site liable to further attacks. UNNA's description of the histological changes is given verbatim, and the points noted in which it differs from that of ALBERCA. As regards pathology the dictum of HUTCHINSON is accepted, that there can be no elephantiasis unless venous and lymphatic obstruction are associated with streptococcal infection, and that the essential pathology is the same whether

the disease occurs in tropical or in temperate climates. The cause of the venous obstruction is usually a thrombosis. The causes of lymphatic obstruction on the other hand are many and are classified as congenital, traumatic and infective (under this head are included the *Filaria Bancrofti*, the tubercle bacillus, syphilis, leprosy, granuloma venereum or inguinale, infective lymphangitis of whatever source, and malignant disease).

After premising that another factor besides lymphatic and venous obstruction is necessary for the production of elephantiasis, the authors quote STARLING'S description of the functions of lymph in furnishing an abundant supply of protein food to inflamed tissues, and suggest that in this disease the protein instead of merely helping in the process of repair, serves by continuous or perverted action consequent on repeated inflammatory attacks to stimulate the connective tissues to excessive growth. In the filarial form they presuppose that, after the death of the worm, its body becomes a nidus for the development of such cocci as may be carried to it by the blood from any septic focus in the body. "The precarious life of the parasites and the prevalence of septic foci make elephantiasis in filarial countries a disease of great frequency; whereas the rarity of the combination of venous obstruction, lymphatic stasis, and streptococcal infection accounts for the small incidence of the disease in non-filarial countries."

Clinical features are briefly but sufficiently described. Treatment includes the removal of septic foci, improvement of general health and powers of resistance, vaccine and serum therapy, elevation, support by suitable bandages or stockings, massage, and operation. For the limbs Kondoleon's operation holds out the best prospect of a cure. The authors do not favour the use of the tourniquet in removal of the elephantoid scrotum.

Reports of six cases follow, three of septic origin, one consequent on venereal disease and surgical trauma, one filarial, and one due to malignant disease of the prostate; cases No. 4 (septic) and No. 6 (malignant) are of absorbing interest. The latter has already been reported by Dr. G. C. Low [*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923, xvii, p. 77, and this *Bulletin*, Vol. 20, p. 902.]

J. J. Pratt.

CLOITRE (J.). Considérations sur l'elephantiasis des organes génitaux externes et des membres dans la région du Sud et du Sud-Est de Madagascar. [**Elephantiasis of Genitals and Limbs in Madagascar.**] — *Bull. Soc. Path. Exot.* 1928. Oct. 10. Vol. 21. No. 8. pp. 722-726. [Fianarantsoa Hosp., Madagascar.]

Elephantiasis is a fairly common affection in the south and south-east of Madagascar occurring chiefly amongst dwellers in or near forest regions. In the course of twelve years 197 cases have come under observation at the Fianarantsoa Hospital. In 152 of these (89 males and 63 females) the external genitals only were affected, in 3 (2 men and 1 woman) the upper limbs only, in 9 (7 males and 2 females) the lower limbs only, and in 33 (30 men and 3 women) both genitals and lower limbs. The general health of the sufferers, in some of whom the growths had attained to very considerable size, was almost always good. In no single instance were microfilariae discovered in the blood, and the author is evidently more than doubtful with regard to the filarial origin of the disease.

Treatment by autohaemotherapy, after the method of DESCARPENTRIES for erysipelas, was carried out in seven cases of elephantiasis of the limbs (3 upper and 4 lower) with appreciable resultant benefit in the patients in whom the arms were affected. In the lower extremity cases, which were of longer standing, no appreciable change was noted.

Surgical treatment was adopted in elephantiasis of the genitals. The author advances no new methods, and prefers operations which can be performed rapidly and without prolonged anaesthesia. In 176 cases of both sexes only one death occurred. In large elephantoid tumours of the scrotum the writer thinks that it may often be difficult to determine with certainty the presence or absence of inguinal hernia, and that it is consequently for many reasons wise for the operator to satisfy himself with regard to this by surgical exploration of the inguinal canals. If a hernia be found it should be dealt with forthwith and removal of the scrotum deferred to a later date. Two cases in point are quoted and interesting details of one of these given. [The site of elephantiasis varies greatly in different countries but it is curious to note the extraordinarily high proportion of female genital cases recorded in this paper—66 in a total of 197, or 33·5 per cent.]

J. J. Pratt.

SANNER. Une technique pour la cure chirurgicale de l'éléphantiasis du scrotum. [**Surgical Treatment of Elephantiasis of the Scrotum.**]—*Ann. de Méd. et de Pharm. Colon.* 1928. July-Aug.-Sept. Vol. 26. No. 3. pp. 295-299. With 2 text figs.

In this paper the author, with the aid of diagrams, advances a method of providing the penis with a covering of normal healthy skin in the operation for removal of the elephantoid scrotum in cases in which the penis has disappeared from view, buried in a mass of diseased tissue. He urges that in such cases the penile integument remains healthy and unchanged, having been merely doubled forward upon itself and stretched so as to form the lining of the tunnel leading to the glans, and that consequently nothing is simpler than to devaginate the organ and restore such covering to its normal position. Accordingly, as the first step of his operation, before liberating the testes and cords and fashioning the flaps available for forming a new scrotum, he makes an incision extending from the pubes to the orifice of the tunnel, surrounding its opening, and continuing in the median line to the lower border of the tumour. The underlying portion of the cutaneous tunnel is first dissected clear of the hypertrophied tissues beneath, and the penis eventually disengaged with its inverted and pendant covering. The latter is folded back and at the end of the operation, which proceeds much on ordinary lines, is united by stitches at the top of the median incision to the lateral flaps formed for covering the testes. The author has carried out this procedure in 38 cases, but of these no details are given. The patients leave hospital at the end of three weeks. [It is doubtful whether in practice this so-called new technique will carry the surgeon further than the advice, already given in text-books, to the effect that in cases of this kind as much of the preputial lining of the tunnel as is healthy should be preserved to assist in forming covering for the penis. That this lining consists of stretched penile integument in addition to the mucous membrane of the prepuce is obvious.]

J. J. Pratt.

WILSON (C. J.). **Tuberculosis in Natives of Kenya.**—*Kenya & East African Med. Jl.* 1928. Jan. Vol. 4. No. 10. pp. 296–316. [Summary appears also in *Bulletin of Hygiene*.]*

“In opening a discussion on Tuberculosis in Natives of Kenya, one has to admit at the outset a most unfortunate lack of knowledge of facts.” This frank statement by Dr. Wilson applies to most of our African dependencies and protectorates, but the fact that the problem is, at last, arousing the interest of the local medical men is an earnest of more accurate observations to come. Though the article under review hardly claims to give accurate information, certain facts appear to emerge, though the statistical basis for them is admittedly unsatisfactory. The author quotes the views of three experienced medical men to the effect that tuberculosis is increasing. The Medical Officer of Health of Nairobi (1925) reported that “the increasing prevalence of tuberculosis can only be described as a matter of grave alarm and one that merits serious consideration.” The Medical Officer of Health of Mombasa (1923) said “the fact remains beyond question that the disease is widespread and appears to be increasing”; while Dr. R. A. W. PROCTER wrote from Fort Hall that “there is no doubt whatever that the disease is increasing rapidly.”

[Dr. Wilson rightly desires to establish the truth about this question rather than to accept individual opinions; but, while the statistics which he presents support the views expressed by the medical men above quoted, they appear to the reviewer to be of much less value than the deliberate opinions formed by Medical Officers with local experience in the course of their duties. The fallacies incident to medical statistics, even in England, are well known and depend on the difficulty of obtaining reliable diagnosis and satisfactory notification; but when, as in the present case, the figures are compiled from admissions and deaths in Government Hospitals, their applicability to the problem of tuberculosis amongst the natives of Kenya is very questionable indeed. It is of interest to note, however, that the average number of tuberculosis deaths in hospitals during 1913, 1914 and 1915 was 22·3 and during 1924, 1925 and 1926, amounted to 78·6. This seems to show that the natives are gradually learning to make a greater use of the hospitals. Further, during the 1913–15 period, the ratio of tuberculosis deaths to total in-patients (all diseases) was 0·255 per cent., this ratio rising in the 1924–1926 period to 0·328 per cent.; so that the figures, as far as they are applicable to a population of about 2½ million natives, suggest that the disease is increasing.]

Of much greater interest is the report of Dr. PHILP of the Tumu Tumu Mission Station, who writes:—

“In 1909 the Church of Scotland Mission established Tumu Tumu Station with a boarding school for boys. From 1909–1920 there was an average of 60 boys in the dormitory among whom no cases of ordinary phthisis or generalized tuberculosis occurred, nor were such cases seen in ordinary hospital patients.”

“During the examination of hundreds of natives for the Carrier Corps in 1916–1917 at Fort Hall and elsewhere, no cases were rejected for tuberculosis. In 1918 the famine occurred, followed by the influenza epidemic.

*This is one of a series of summaries on tuberculosis in the tropics which it was proposed to publish in both the *Bulletin of Hygiene* and the *Tropical Diseases Bulletin*; exigencies of space have compelled us to restrict the second publication to the summary of WILSON's paper: the others and many more of great interest will be found in the *Bulletin of Hygiene* for July, 1929.—Ed.

From 1920 onwards the picture completely changed. The old type of acute tubercular pneumonia disappeared, and its place was taken by ordinary phthisis and generalized tuberculosis."

Of particular interest is a remark by Dr. PHILP that in the old days (1909-1920) "there were seen in hospital occasional cases of acute broncho-pneumonia with tubercle bacilli in the sputum. Such cases ran an acute course, recovered, and were not left with any sequelae." [If the organism seen in the sputum in these cases was really the tubercle bacillus and not some other acid-fast organism this record is of great importance and not at all in line with the accepted view; but there is much evidence that Africans, when they contract tuberculosis under the natural conditions of tribal life and without the added strain of military service or industrial work, may exhibit the benign clinical type often seen in children of school age in Europe, a type seldom associated with a positive sputum.]

Dr. GILLAN, now in charge of Tumu Tumu Hospital, gives a very different picture of the medical examination of candidates for admission to dormitory than that given by Dr. PHILP for 1909-1920.

"Three months ago," he writes, "I examined candidates for admission to dormitory and rejected the following numbers on account of physical signs which I thought indicated the presence of tubercle: of 24 males, were rejected 4; of the remaining 20, one developed signs and symptoms later: of 10 females, were rejected 2; of the remaining 8, one developed the disease in the knee-joint."

Dr. Wilson considers that there are no adequate grounds for the supposition that pulmonary tuberculosis in the African usually runs an acute course to a fatal termination. On the contrary, he thinks the evidence points to a chronic form of the disease. As evidence for this unconventional view he quotes seven post-mortems on natives in hospitals at Nairobi. [To judge by the descriptions of the organs of these cases, however, as seen at autopsy, the tuberculosis cannot have been "chronic" in the usual sense of the term.] As further evidence for the relatively chronic character of the disease in Africans, he quotes 13 cases from the Native Civil Hospital, 6 of whom were discharged, 4 of these being free from signs or symptoms of active disease. Seven, however, died after an illness averaging 6 weeks, 2 of these being "almost certainly chronic cases in the terminal stage." [While nobody can doubt that Africans sometimes suffer from chronic tuberculosis, the evidence adduced by Dr. Wilson to show that it is *usually* chronic does not appear conclusive.] Dr. Wilson makes an appeal for a further study of tuberculosis in Kenya and rightly points out that, without more accurate knowledge, it is impossible to formulate a successful campaign against the disease.

S. L. Cummins.

SITSSEN (A. E.). Het anatomische beeld der tuberculose op Java. [**The Anatomic Aspect of Tuberculosis in Java.**—*Nederl. Tijdschr. v. Geneesk.* 1927. Aug. 13. 71st Year. 2nd Half. No. 7. pp. 726-737. [4 refs.]]

Out of a series of 3,155 post-mortem examinations in Malays who died of natural causes at Sourabaya (Java), in 726 cases the cause of death was tuberculosis. The sexes were equally affected; no particular class of age was especially prevalent in the series.

The tuberculous affection of the various organs is separately dealt

with and the author arrives at the following conclusions concerning the aspect of tuberculosis in the Malay race :

(1) The regular course of the disease is a chronic one, though of a much shorter duration than in Europe.

(2) The lymph glands are generally affected, in most cases, however, in connexion with the pulmonary process.

(3) Intestinal tuberculosis is a common complication of the last stages, but is rarely primary.

(4) Laryngeal tuberculosis occurs in the same way, never as a primary affection.

(5) Tuberculosis of the spleen (miliary, but sometimes larger tubercles) likewise constitutes a complication of the ultimate stages of the disease.

(6) The liver shows the same symptoms ; more extensive affection is rare.

(7) The urogenital system is rarely affected except for miliary tubercles in the kidneys in the last stages.

(8) Cerebral tuberculosis is rare.

(9) The heart muscle may be the site of the infection in rare cases.

(10) The endocrine organs are also subject to the affection in rare cases.

(11) Predominant affection of the serous membranes is relatively rare.

(12) Bones and joints are fairly often affected ; in such cases repeatedly the lungs were found to show little or no signs of tuberculosis.

(13) The skin may become affected.

(14) Acute generalized miliary tuberculosis is rare.

(15) Sometimes pulmonary tuberculosis is less marked and the predominant alterations are found in serous membranes and lymph glands. In other cases only acute pulmonary alterations were found (pneumonic type). The author ascribes the peculiar course to unfavourable external influences.

W. J. Bais.

CIOTOLA (Alberto). Diffusione della tubercolosi in Eritrea. [**Tuberculosis in Eritrea.**].—*Arch. Ital. Sci. Med. Colon.* 1929. Feb. 1. Vol. 10. No. 2. pp. 79-85. [5 refs.] English summary p. 85. ["Regina Elena" Colonial Hosp., Asmara, Eritrea.]

Natives of Eritrea who were transferred to North Africa for military service were found on return to be infected in considerable numbers with tuberculosis, which is rare in Eritrea. Seeing that the climate of that country is unfavourable to its spread, the author does not anticipate any extension of the disease.

A. G. B.

SUK (V.). On the Occurrence of Syphilis and Tuberculosis amongst Eskimos and Mixed Breeds of the North Coast of Labrador. (A Contribution to the Question of the Extermination of Aboriginal Races).—*Publications de la Faculté des Sciences de l'Université Masaryk.* Brno, Czechoslovakia. 1927. No. 84. 18 pp. With 6 text figs. (1. map). [Summary appears also in *Bulletin of Hygiene.*]

This paper, a very important one, bears the sinister sub-title of "a contribution to the question of the extermination of aboriginal races," the significance of which will not be lost on those who have studied the effects of European contact with races at the more primitive stages of culture. After a preliminary discussion on the introduction of syphilis, a disease unknown amongst the Eskimoes prior to their association with persons of European stock, Professor Suk passes on to

the "occurrence of tuberculosis," a disease, like syphilis, unknown to Eskimos, "a stock without any history of tuberculosis and in consequence no immunity at all."

We cannot do better, in this summary, than to start by quoting the opening paragraph of Dr. Suk's paper:—

"About thirty years ago Lieutenant Peary brought six Smith's Sound Eskimos to New York; within one or two years four of them were dead, they succumbed to acute tuberculosis. One of those Eskimos was Kishu, a chief of his tribe, about 45 years of age, he measured 1.64 m. in height, weighed about 170 lbs., was muscular, and in every respect normally developed. He died at Bellevue Hospital, New York, of acute general tuberculosis within less than five months after the inception of his disease."

Dr. Suk, a professor of anthropology and therefore in a position to speak with authority on a geographico-ethnological problem, has some interesting remarks to make on this question of racial susceptibility to tuberculosis after a summer and autumn spent in dealing with the diseases of the Eskimos at Mikkovik, Hopedale, Nain, Okkak, and finally the more northerly and primitive station of Hebron on the coast of Labrador. He quotes HUTTON, a medical missionary who had worked on the Labrador coast up to 1912, to the effect that tuberculosis there is "a very fatal disease . . . The prognosis seems hopeless, so strong is the grip of the disease—or rather, so weak is the resisting power of the Eskimo constitution." Dr. Suk's commentary is as follows: "To our mind the resisting power of the Eskimo constitution is not weak absolutely, only in relation to the new diseases acquired in recent years; they had simply no chance to develop any kind of resistance. The careful study of the history and geography of disease shows that this is always the case with new diseases among people up to the present not touched by them."

It would seem that tuberculosis is still much more widespread amongst the "Settlers" and half-castes than amongst the pure Eskimos. This is well brought out in the records of Von Pirquet tuberculin tests on the children of different communities along the coast:—

	Number of cases.	Reactions.		Percentage of positive reactions.
		Negative.	Positive.	
Pure Eskimo children ...	51	46	5	9.8
Half castes and other mixed breeds of different shades ...	32	14	18	56.2

It is of great interest to read that those pure Eskimos who, in spite of the presence of the white man, still maintain their old established dietary (of seal meat and blubber) are particularly free from tuberculosis. [Here we are reminded of the sudden and rapid spread of tuberculosis amongst the Red Indians of Canada on the extermination of the buffalo, their natural food; and we would add that it was not only the want of fresh meat, but the sudden dependence for food upon the white man's supplies, and the consequent change from the life of a free hunter to the monotony and idleness of a "location" existence, that proved so fatal to the Indian tribesman.] It looks as if the same fate were impending for the Eskimo. "How long," asks Dr. Suk, "will the natural supply of seal meat and blubber last. . .

The people on the whole North Coast need only a few thousands of seals, but further south there is a slaughtering going on, year after year, hundreds and hundreds of thousands of seals, adult and babies—a slaughtering which reminds one of the extermination of the bison on the prairies.” Dr. Suk expresses surprise that this slaughter of the innocents should be permitted while, as he says, “there are some Societies which would almost fight for every life of a rat or mouse which has to be sacrificed in the bacteriological laboratories.” The author turns, at this point, to consider under five headings, the different reasons which explain the extermination of aboriginal peoples when brought into contact with civilized man:—

“The outlook,” he concludes, “is grave . . . There are already National Parks in many countries, various natural zoological gardens for rare animals; perhaps one day we shall have some Anthropological Gardens for interesting primitive races.”

S. L. Cummins.

VAN BERKHOUT (P. J. Teding). Contribution à l'étude du métabolisme basal chez les habitants des tropiques. [**Study of the Basal Metabolism of the Inhabitants of the Tropics.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 1. pp. 1-69. With 6 figs. & 5 plates. [Refs. in footnotes.] [Med. Lab., Weltevreden.]

This work is prefaced by a discussion of the results of other workers and a description of the different methods which have been used to determine the basal metabolism. The experiments were made in Java using as subjects only males consisting of 18 Europeans, 3 Indo-Europeans and 16 natives. The Europeans varied in age between 27 and 66 years and in period of residence in the tropics between 4 weeks and 30 years. The basal metabolism was determined by a combination of Krogh's and the Douglas-Haldane methods, using both the du Bois and the Benedict formula for calculating the surface area. The figures so obtained were compared by statistical methods with the normal figures for subjects of the same height and weight living in temperate climes. Six determinations at least were made on each subject on different days. The results in the case of the Europeans resident in the tropics are claimed to be in complete accord with other investigations made within the last eight or nine years in other tropical countries and indicate a lowering of the basal metabolism in torrid regions. In the case of the natives examined they also were found to have a lower basal metabolism than the standard value for individuals of their height and weight living in temperate districts.

M. E. Delafield.

VAN BERKHOUT (P. J. Teding). Etude sur la thermogenese des habitants des tropiques pendant la marche sur une surface horizontale. [**A Study of the Heat Production of Inhabitants of the Tropics whilst walking on a Level Surface.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 1. pp. 71-80. With 2 plates. [16 refs.] [Med. Lab., Weltevreden.]

Using similar experimental methods as in the previous work the author determined the heat output, in gram-calories per kilogram-metre, of European and Malay subjects whilst walking on the level. The

output is doubled if the subject walks at a rate of 90 instead of 60 metres per minute. The total heat production in the case of the Malays was considerably greater than with the Europeans.

M. E. Delafield.

EYKMAN (C.). Le metabolisme basal des habitants des pays tropicaux. (A propos de l'article de M. Jhr. Dr. P. J. Teding VAN BERKHOUT dans le fascicule 1, T.XVII, 1928). [**The Basal Metabolism of the Inhabitants of the Tropics. (With Reference to the Article of M. Jhr. Dr. P. J. Teding van Berkhout in No. 1 of Vol. 17.)**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 1. pp. 81-84.

This is a spirited criticism of a previous paper of Dr. VAN BERKHOUT. Dr. Eykman replies to the adverse comments made on his own work, and maintains that his results show that there is no sensible difference between the basal metabolic rate in the tropics and in temperate climes. He adverts to the different results obtained by different workers and claims that the figures given are not significant. He points out that there are included among the subjects examined three who had only been in Java for a week, and suggests that had their basal metabolism been investigated whilst in Europe it would have been found to be below standard. More extended observations are asked for, to be made on a sufficiently large group of subjects shortly after arrival in the tropics and again after six months' residence.

M. E. Delafield.

MONTEL (M. L. R.). La prophylaxie du tétanos ombilical à Saïgon (Cochinchine). [**Prevention of Umbilical Tetanus at Saïgon.**]—*Bull. Soc. Path. Exot.* 1929. Jan. 9. Vol. 22. No. 1. pp. 6-7.

Twenty-five years ago umbilical tetanus at Saïgon was a scourge. After the birth the cord was severed, or crushed, with a fragment of porcelain picked up off the ground, and in the first ten days 20 per cent. of the babies succumbed to tetanus. In 1905 measures of prevention were taken by Dr. DEJEAN DE LA BATIE. The midwives were called together and on a model was shown the technique of ligature, division and dressing of the cord; curved scissors were distributed, and sterilized umbilical dressings containing a ligature, compress of medicated lint, cotton wool and a gauze bandage, with a second dressing to be applied after the fall of the cord. Every matron who brought a living baby with a healthy umbilical scar at the 20th day received a prize, in value one-third of the fee asked for the confinement. Births were reported and visits paid by a doctor twice a week, on which occasions an infirmier performed vaccination. Gradually the old midwives were replaced by nurses trained at the Maternity Hospital, Cholon. All the changes took place without friction. The tetanus mortality dropped from 20 to 3.3 per cent.; and is now between 0.75 and 0.95 per cent. The infantile mortality of the first month was in 1905 23.5 per cent.; in 1907 it was 6 per cent., at about which figure it has remained. By these simple means tetanus of the new-born has been banished from Saïgon.

A. G. B.

REVIEWS AND NOTICES.

BALFOUR (Margaret I.) [C.B.E., M.B., C.M., Late Chief Medical Officer, Women's Medical Service, India] & YOUNG (Ruth) [M.B.E., B.Sc., M.B., Ch.B.]. **The Work of Medical Women in India.** With a Foreword by Dame Mary SCHARLIEB, D.B.E., J.P., M.D., M.S.—pp. xiv+201. With 1 folding map & 5 plates. 1929. London: New York: Toronto: Melbourne: Bombay: Calcutta: Madras: Humphrey Milford, Oxford University Press. [9s.]

"Perhaps there is no country in the world where men and women live under such different conditions as in India. The man has education—medical aid—the power to earn his living—the right to move about freely and voice his grievances. And what is it that bars women from doing the same? Not the decree of the foreign Government—but the inexorable tyranny of domestic custom and habit" (p. 64).

This short extract gives a key to the book and to the great need for medical women in India. Only among Parsees, Christians and aborigines can a woman receive proper treatment from a man doctor. When Caste and the purdah seclude the Hindu and Mahomedan woman he can at most feel a pulse and see a tongue through a slit in a curtain. The authors describe the field of work; Purdah System, decreasing among the wealthy as education increases; Caste, Early Marriage, Hindu Widows, Childless wives and the lack of education among the women of India. Chapters ii and vi are filled with a well written story of the early pioneers and those that followed them; including accounts of the origin of the Lady Dufferin Fund, etc., and the formation and official recognition of the "Women's Medical Service." At first there were only makeshift hospitals and no trained assistants. More than fifty years have passed since the first medical woman went out to help her Indian sisters. Miss Clara SWAIN, M.D. (Penn.), U.S.A., arrived in Barielly in January, 1870; she was attached to the "Women's Foreign Mission of the Methodist Episcopal Church." Many of the pioneers and many of those now working in India belong to missions and the work of women medical missionaries receives full credit in Chapter v of this volume. Of the pioneers who followed Dr. Swain some of the best known are Dame Mary SCHARLIEB, Dr. PECHEY and Dr. BIELBY, who was well known to the reviewer and was greatly respected. The frontispiece gives portraits of two Indian ladies: Miss D. JAGANADHAN, qualified 1890, died 1894, and Miss RUKHMABAI, L.R.C.P. & S.E., 1895. In the chapter on the medical education of women in India we find that Madras was the pioneer. Of four students who entered the certificate class at the Madras Medical College, in 1875, one was Mrs. Scharlieb. She then went to England and qualified in London. Returning to Madras she was appointed lecturer on midwifery and superintendent of the recently opened Caste and Gosha Hospital for women. There are chapters on preventive medicine, miscellaneous activities and Appendices containing statistics of: Maternal mortality in childbirth in India; Infant mortality; Early motherhood. The illustrations include portraits of Dame Mary Scharlieb and other pioneers and a beautiful photograph of the Lady Reading Hospital, Simla. The authors have done their work well and the book will be of interest to many readers outside the medical profession.

J. H. Tull Walsh.

CHESTERMAN (Clement C.) [O.B.E., M.D. (Lond.), M.R.C.P., D.T.M. & H. (Camb.)]. **African Dispensary Handbook. An Aid to the Training and Practice of African Medical Assistants and for the Guidance of all engaged in Medical Practice in the Dispensaries of Africa.**—pp. xii+276. With 19 plates (3 coloured). London: The Christian Literature Society for India & Africa & the Sheldon Press, Northumberland Avenue, W.C. 2. [4s. 6d.]

Those who have any experience of teaching the partially educated African native the elements of medical science and practice can appreciate the difficulties of the task. Quite apart from the limited intelligence or previous education of the African student is the dearth of literature dealing with science in the vernacular. There are two alternatives before the author or the teacher. He may attempt to produce a very simple manual in the vernacular of the tribe amongst which he is working, or he may write in English. Both methods have been attempted, and both have their advantages and disadvantages. If the book be written in the vernacular, it will obviously be more intelligible to the unaided student; but its usefulness will be limited to one small tribe, and the translator will find the work extremely difficult. He will have to coin words unknown to the language and to present ideas and conceptions more foreign still. On every page he will have to make digressions into cognate sciences to explain the inevitable references to biology, chemistry, anatomy, physiology, and pharmacology.

If the book be written in English, it will be practically unintelligible to the unaided student. Such a table, for instance, as that given on page 5 of Dr. Chesterman's book for the differential diagnoses between heat-exhaustion and heat-stroke—what African native, however familiar with English, could grasp its meaning, without laborious and careful explanation line by line? But this is no argument against the value of such a book in the hands of a competent teacher, familiar with the native language and ideas and resourceful in illustration. The presentation of the subject in English has the immense advantage that it is equally serviceable all over Africa; it paves the way to the understanding of other works of reference in English, it is unfettered in terminology, and, last but not least, it can be presented, as has been most successfully accomplished by Dr. Chesterman, in concise and almost tabular form, with delightful freedom from digression, and an attractive assumption that the teacher at any rate knows exactly what is meant. In other words, it transfers from author to teacher the onus of explanation, and riveting in the ideas presented. And wisely so, for it is only by a method of searching cross-examination that the teacher can really know if the lesson has been understood.

And now to the book itself. It consists of four sections: (1) Medical. (2) Surgical. (3) Dispensing Notes and Pharmacopoeia (English and French). (4) Laboratory Notes and lists of necessary drugs and equipment for an African dispensary. The diseases referred to in the first two sections are such as are common in Africa. The plates and illustrations are abundant and good. The information is reliable and up-to-date. Diseases at present unknown in Africa (e.g., scarlet fever, sprue, etc.) are wisely omitted, and even cancer—undoubtedly rare in tropical Africa—finds but brief mention. In this we think the author has shown wise discrimination and perspective. There are a few very helpful paragraphs on the external diseases of the eye, and a passing reference to iritis, glaucoma, and cataract. The practical chapter on minor surgery is excellent. In future editions we suggest the advisability of the author including chapters on elementary biology, simple hygiene, and welfare work—so all-important in dispensary instructions.

The Pharmacopoeia section is simple and clear, and the metric system used makes it undoubtedly easier for the dispenser; for parts of Africa where the English system is used it would be advantageous to have this

chapter adapted to the English measure. A compromise is made on pp. 271-2 by a series of conversion-tables.

The laboratory notes are thorough and leave little to be desired.

The book is interleaved between the sections; perhaps it would be better in future editions to interleave it throughout so that teacher and taught can make special notes in their appropriate place. A few inevitable misprints require correction in the next edition.

The gifted author of this little manual is to be congratulated on having produced a work that will be of use all over Africa, and specially tropical Africa, and on having brought at least one step forward the medical education of the African student.

J. Howard Cook.

KUCZYNSKI (Max H.) [Dr. Phil. et Med. Professor an der Universität Berlin, Abteilungsvorsteher am pathologischen Institut]. **Der Erreger des Gelbfiebers. Wesen und Wirkung.** Gemeinsame Untersuchungen mit Bianca HOHENADEL. [The Agent of Yellow Fever. Its Nature and Action.]—191 pp. With 158 text figs. 1929. Berlin: Verlag von Julius Springer. [Rm. 24.]

This work is essentially an expansion of the authors' experiments and observations, reviewed in this *Bulletin*, Vol. 26, p. 296, in which evidence is brought forward in support of the view that an organism named *Bacillus hepatodystrophicans* is the causative agent of yellow fever.

Apart from the large number of experiments on this question, the authors also record many original observations on yellow fever, based on their studies of both African and South American strains of the virus, but in the short space available it is impossible to do more than briefly indicate the scope of the work.

After a short general introduction the question of the virus in the monkey is discussed, based on experiments with four different strains. The results indicate that the virus lives in the blood and the inoculation of infected blood produced a more rapid infection than the inoculation of infected liver. The virus was shown to be present in the circulation of monkeys inoculated with infected blood as soon as 8 minutes after the inoculation and in other cases from 4 to 18 hours later. When liver was used a longer interval elapsed before the virus could be demonstrated in the blood.

Many of the infections were extremely rapid, with a duration of only 3 to 4 days, and also were almost invariably fatal, except in very young animals, which were more resistant.

Details are then given of the culture media [see this *Bulletin*, Vol. 26, p. 296] and the results of a large number of culture experiments. The best method of obtaining primary cultures in tubes of the special ascitic agar medium, was by the introduction of pieces of heart muscle of an infected monkey, killed a few hours after the first rise in temperature. After an incubation of 6 to 8 days, but sometimes longer, up to 20 days, at 36° C., successful cultures show an obvious growth of organisms which generally appear first between the implanted tissue and the wall of the tube. Subcultures are made every 2 or 3 weeks by the transference of about 0.5 cc. of the culture into fresh tubes with or without pieces of sterile rabbit kidney.

The bacillus once obtained seems to be fairly resistant, for cultures kept at room temperatures may persist up to two months; moreover, it will withstand the effect of 0.5 per cent. phenol for as long as 2 weeks.

The results of infection experiments with cultures of this organism are next described and the authors carefully discuss the possibility of the presence of an invisible virus, living concurrently with the bacillus. Their experiments support the view that the unchanged virus cannot persist under cultural conditions for more than 5 days. They have succeeded,

however, in obtaining typical yellow fever infections in monkeys by the inoculation of culture material after 13 subcultures and after intervals up to six months after isolation of the original culture. Unless these cultures contained *Bacillus hepatodystrophicans* their inoculation into monkeys invariably gave negative results, which is evidence against the possibility of the persistence of an invisible virus.

The inoculation of cultures into monkeys, although sometimes followed by a typically fatal infection, more often produces a chronic type with a long incubation period and sometimes with one or more relapses, which may end in death. By *passage* through two or three monkeys, however, it is possible to obtain the full virulence.

The authors describe the results of protection experiments in human beings. In most instances 0.1 to 0.5 cc. of a well-grown culture was mixed with immune serum and inoculated into the patient, a second inoculation being given 10 days later. Five of these subjects subsequently acquired laboratory infections, proved by subinoculation into monkeys, but in every instance the attack was very mild, consisting only of one or two days' fever, but with characteristic changes in the blood.

An interesting chapter is devoted to the early diagnosis of yellow fever by means of blood examination. Characteristic alterations in the leucocytes were found on the first day of fever, the most important being an influx of immature neutrophils, which on the second day often contain fat globules. The number of lymphocytes falls and in severe cases becomes very low; subsequently the number may rise, this being a very favourable prognostic sign. Resistant cases also show typical monocytosis up to 35 per cent. There is a very marked fall in the sugar content of the blood which is of great importance from a diagnostic and pathogenic point of view.

The authors found a very much higher virus content in the blood than any previously recorded, and by dilution experiments showed that there may be at least 1,000,000 minimal lethal doses in each cc. Various abnormal forms of the disease both in man and monkeys are then described, which confirm the view that in nature many cases escape recognition.

A special chapter is devoted to the question whether the cultures merely contain persistent virus or represent a true development. The most striking argument is the fact that primary cultures may give negative results when inoculated into susceptible monkeys, whilst later subcultures give positive results. In addition, infections were never obtained by the inoculation of cultures unless the bacillus was present.

Experiments with mosquitoes are then described and it was found possible to infect these insects by feeding them on cultures of the bacillus. It was necessary to feed them repeatedly with small doses of the cultures, as a large meal was fatal. Mosquitoes infected in this manner produced typical yellow fever when fed on monkeys. Infected mosquitoes were found to contain living virus 3 days after death, when kept at 31° C.

The microscopical examination of infected mosquitoes showed the presence of very fine coccoid and bacillary forms on the surface of the epithelium in the midgut, which resemble the cultural forms. Males as well as females were infected by feeding on infected material.

Finally a chapter is devoted to the nature of yellow fever which is described as a *Hepatodystrophia glykopriva acuta infectiosa*, the most important symptom being the fall in the blood sugar content, following the destruction of the liver cells which control the formation of glycogen. Consequently treatment should be based on this symptom and every effort made to replace the loss of sugar.

In an appendix the authors describe experiments made in Rio de Janeiro confirming their views as to the nature of the cultures, and also indicating the susceptibility of three species of Brazilian monkeys, the marmoset, squirrel monkey and *Cebus*.

The scope of this work will be evident from this brief outline of the contents and the original should be read by those interested in the subject of yellow fever. Numerous figures, for the most part well reproduced,

help to give a clear idea of the authors' observations. Unfortunately the price of this publication, 24 shillings for a paper-backed brochure of 191 pages, is a glaring example of the absurd prices charged by German publishers since the war.

E. Hindle.

HOGARTH (A. Moore) [F.E.S.]. **The Rat: a World Menace.** With Preface by Sir Thomas HORDER, Bart., K.C.V.O., M.D., F.R.C.P. —pp. vi+112. With 2 plates & 5 text figs. 1929. London: John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, W. 1. [7s. 6d.] [Review appears also in *Bulletin of Hygiene.*]

This book is dedicated to the Medical Officers of Health of Great Britain, who are credited with having saved the unsatisfactory Rats and Mice Destruction Act from being utterly abortive.

Beginning with an account of the campaign which led up to the passing of the Rats and Mice Destruction Act, the author goes on to describe the habits and the amazing fecundity of rats. It is estimated that the rats in Great Britain are at least equal in number to the human population and the mice twice as numerous and that rats and mice cost the country not less than £100,000,000 per annum in food consumed and wasted. A chapter on the rat as a carrier of disease rather overstates the case. Though trypanosomes are commonly found in the blood of rats they are not the cause of human trypanosomiasis as is implied. There also appears to be some confusion between sleeping sickness and encephalitis lethargica. Mice are not directly charged with, but are stated to be under suspicion as factors in, the causation of cancer, leprosy, mange and foot-and-mouth disease.

The chapters on the natural enemies of the rat and the various methods of rat destruction are complete, instructive and interesting, particularly those on trapping and poisoning. Stress is laid on the importance of sudden attacks on a large scale and of varying the tactics employed. A wide choice of methods is described and even the amateur rat-catcher should be able to achieve considerable success if he is prepared to tackle the problem seriously on the lines laid down in this book. Virus receives a special chapter and the importance of selecting only those preparations which are effective against rats but harmless to man is made clear. Rat-proofing of buildings in both rural and urban districts is described. A short chapter is devoted to rats on board ship, but the recommendation that "every vessel should be fumigated as soon as empty" is impracticable.

The reason for the references in the last chapter to epidemics of influenza and dengue is not clear.

The book is undoubtedly well worthy of study by everybody who is interested in rat-destruction, either in principle or in practice and its value would be enhanced rather than diminished by the exclusion of such small sections as appear to be over-statements of the case against the rat.

Chas. F. White.

TROPICAL DISEASES BULLETIN.

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KALA AZAR.

ADLER (S.) & THEODOR (O.). **The Distribution of Sandflies and Leishmaniasis in Palestine, Syria and Mesopotamia.**—*Ann. Trop. Med. & Parasit.* 1929. June 27. Vol. 23. No. 2. pp. 269–306. With 1 plate, 9 figs. & 2 maps. [29 refs.] [Microbiol. Inst., Hebrew Univ., Jerusalem.]

From May 12th to October 20th 1928 the authors carried out a survey of sandflies of Mesopotamia, Syria and Transjordan and studied their distribution in relation to the incidence of leishmaniasis. The results are compared with the experiences they have had in Palestine. In addition to the known species of sandfly—*Phlebotomus papatasi*, *P. sergenti*, *P. major*, *P. chinensis*, *P. minutus* and its variety *niger*, *P. africanus* and *P. palestinensis*—there were discovered two new species which are named *P. baghdadis* and *P. iraqi* and an unnamed form related to *P. clydei*. Dissection of sandflies revealed the following parasites: (1) *Fungi*. In the coelom and ova of *P. papatasi* in Palestine and in this species and *P. sergenti* in Mesopotamia and Syria. Infected eggs are completely destroyed. (2) *Nematodes*. In the haemocoel of *P. papatasi* and *P. sergenti* in Baghdad. Eggs and hatched larvae were numerous and the latter pass into the ovary and may escape with the eggs when they probably invade the sandfly larvae. Several laboratory-bred flies were infected. (3) *Crithidia*. In five out of 78 specimens of *P. baghdadis* in Baghdad. The vertebrate host is probably the gecko. (4) *Mites*. Occasionally found attached to the abdomen of *P. papatasi* and *P. sergenti*. (5) *Sporozoa*. The oocyst probably of a species of hepatozoon was found in *P. papatasi* in Jericho in 1925. In addition flagellates of the leptomonas type were found in about 0.1 per cent. of *P. papatasi* in Jericho in 1925 and in two of 683 *P. sergenti* in Baghdad in 1928. As regards the former, inoculation into the skin of human beings produced oriental sore in three instances, so that the flagellates were undoubtedly *Leishmania tropica*. In the case of the latter, as far as present knowledge goes, they could have been derived only from man, dog or gecko.

The distribution of the sandflies and leishmaniasis is discussed at some length, and the authors arrive at the following conclusions, which are based partly on the capacity of strains of the parasite to develop in sandflies. Both *P. papatasi* and *P. sergenti* are carriers of oriental sore. In Baghdad the latter is the main carrier, in Jericho and Bar

Elias the former is the only carrier, while in Aleppo both are incriminated. There are, however, localities free from leishmaniasis in which both these sandflies occur. Peculiarities in the distribution of oriental sore result from variations in the infectivity of different strains of *L. tropica* for the sandfly.

The paper gives the diagnostic characters of the sandflies mentioned and details of their distribution in the areas surveyed.

C. M. Wenyon.

ARTAMONOFF (A. C.). Contribution à l'étude épidémiologique de la leishmaniose viscérale de l'Asie centrale. [**Epidemiology of Visceral Leishmaniasis in Central Asia.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 4. pp. 205-217. With 4 text figs. [17 refs.] [In Russian. French summary pp. 217-218.] [Trop. Med. Station, Kokand.]

In Central Asia during the period 1924 to 1928 510 cases of kala azar have been noted. As a result of his own enquiries into 314 cases seen by himself during the same period, the author has arrived at the following conclusions. The centres for the disease follow the Central Asian railway from Kzyl-aravat to Andijan and Tshimkent. It extends laterally from the great centres of Samarkand, Kokand and Andijan, in which it occurs chiefly in the sectors of the railway stations, and more frequently amongst Europeans than natives. Of the 314 cases, only 100 were in natives, a fact which may be explained by the more careful attention which was given to the European population. One-third of the cases were in children of 1 to 2 years of age, one-fifth in those of 2 to 3 years. The disease became less frequent with increase of age, so that for the age period 12 to 32 years only 16 cases were noted. In the European quarter of Samarkand, and in the railway station quarter of that town and Kokand, there was an annual incidence of 4 per cent. amongst children of 1 to 3 years of age. An examination of the habits of life of the people revealed no factor which could be regarded as influencing the incidence of the disease. As a result of blood grouping, there was found to be a greater incidence amongst group IV, but this is not peculiar to kala azar, and may indicate merely a greater susceptibility to disease in general. The cases are equally distributed throughout the year, with the exception of a slight increase in February. If the incubation period is considered to be four months, it would seem that transmission by sandflies will hardly explain the method of infection particularly with regard to the cases seen in April. There does not appear to be any relationship between the distribution of the human and canine diseases. The occurrence of the cutaneous disease in cases of kala azar, four instances of which have been reported, is suggestive of a difference between the viruses of the two diseases.

C. M. W.

ALEXANDRIDES (Karl). Ueber das Vorkommen von Kala-azar in Mazedonien. [**Occurrence of Kala Azar in Macedonia.**]—*Arch. f. Schiffshygiene. Trop.-Hyg.* 1929. Oct. Vol. 33. No. 10. pp. 542-544.

The occurrence of infantile kala azar in Macedonia was first noted by the author in 1925, when he diagnosed the disease in a case from Seres. Next year he saw a case from Drama and another from Salonika. He recorded

these cases in March 1927 in the *Salonikier medizinische Wochenschrift*. Since then other cases have been noted in the districts of Seres, Drama, Cavalla and Salonika. The details of four of these cases are given.

C. M. W.

NAPIER (Everard). Travaux de la Commission du kala-azar dans l'Inde Britannique en 1928. [**Work of the Kala Azar Commission in British India in 1928.**]—*Bull. Office Internat. d' Hyg. Publique*. 1929. May. Vol. 21. No. 5. pp. 778–781.

This is a short résumé of the kala azar investigations in India during 1928. All the information contained in it has been published with the exception of the statement that amongst the first 200 wild specimens of *Phlebotomus argentipes* which were dissected in Assam, seven were found to be infected with a flagellate morphologically identical with *Leishmania donovani*. Hitherto only one naturally infected fly has been recorded (this *Bulletin*, Vol. 24, p. 133), so that the reviewer is led to suspect that the statement may not be correct.

C. M. W.

STRUTHERS (Ernest B.). **Splenomegaly—the Diagnosis of Kala Azar.**—*China Med. Jl.* 1929. Aug. Vol. 43. No. 8. pp. 772–774.

The author emphasizes the importance of suspecting kala azar in all cases with enlargement of the spleen if they come from endemic foci of the disease, which in China comprise the provinces of Kiangsu, Anhwei, Honan, Shantung and Hopei, all north of the Yangtse River. He mentions cases which were admitted to hospital for such complaints as dysentery or gastric trouble, and others in which kala azar was suspected, and the parasites were discovered only after two or more punctures of the liver or spleen. One case was admitted with a tentative diagnosis of syphilis; the condition was proved to be kala azar by discovery of parasites at the fourth spleen puncture. On the other hand, in an area like Shantung, nearly everyone with an enlarged spleen considers it to be the result of kala azar, and comes for treatment. Among these have been found cases of myeloid leukaemia, chronic infective endocarditis, malaria, syphilis, and splenic anaemia. An analysis of 60 cases of kala azar shows that, in order of frequency, the following are the most usual signs: enlargement of spleen, fever, loss of strength, bleeding from nose, bleeding from gums, emaciation, anorexia, cough, diarrhoea or dysentery, sweats, chills, abdominal discomfort, amenorrhoea, pigment spots, cancrum oris, stomach trouble.

C. M. W.

PRATES (Manuel Máximo). [In Portuguese & English.] Um caso de kala-azar. Diagnosticado em Moçambique numa criança portuguesa. Comunicado ao Congresso de Medicina Tropical do Cairo—Dezembro de 1928. **A Case of Kala-Azar diagnosed in a Portuguese Child in Mozambique.**—8 pp. With 2 figs. & 1 folding chart. 1928. Lourenço Marques.

A child which was taken from Portugal to Mozambique when nine and a half months old lived there in excellent health up to the age of 25 months when there was an attack of fever, which responded to quinine treatment. During the next three months the child was comparatively well and regained

its lost weight. Then there was further fever, which did not respond to quinine but which was modified by emetine injections. Kala azar was suspected and a laboratory examination confirmed this.

The disease is endemic in Portugal, but the long period of good health after leaving that country suggests a possible infection in Mozambique, where there are many Indian immigrants. Since this case was seen, others of a similar kind, which responded to tartar emetic but not to quinine, have been noted, so that it is possible that the disease is actually endemic in Mozambique. The first case, in which the diagnosis was made by discovery of leishmania, is now apparently cured as a result of 12 injections of stibosan.

C. M. W.

UMAR (M.). **Kala-Azar in Bijnor.**—*Indian Med. Gaz.* 1929. June. Vol. 64. No. 6. pp. 322-323.

In this paper the author describes as kala azar, eight cases seen by him in Bijnor, United Provinces. In all cases the diagnosis was made clinically and by the application of the formol-gel and antimony tests. There was also response to antimony treatment. In an editorial note it is pointed out that as regards the distribution of the disease the actual finding of the parasite by experts is necessary before any place can be included in the list of endemic foci. A spleen smear and serum from one case were sent to the editor. There were no parasites in the smear, while the serum was not positive with the aldehyde test.

C. M. W.

NAPIER (L. Everard) & HALDAR (K. C.). **A Case of Induced Polyleucocythaemia.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 382-385. With 1 text fig. [1 ref.] [Calcutta School of Trop. Med. & Hyg., Calcutta.]

A Hindu male 28 years of age was admitted to hospital with kala azar of the ordinary type. He was given eight injections of neostibosan at intervals of 48 hours. As the fever continued up to the second week of treatment he was given cinchona febrifuge. After this the temperature fell to normal and did not rise again. Twelve days after the completion of the course of treatment a blood count showed 9,440 white cells per cmm. After another 12 days the count was 25,625. There was a steady increase up to 67,435 and, during the sixth week after treatment, to 144,375. There was a steady fall during the next 35 days to 31,600. The patient was discharged when the 30,000 mark was reached. At first the rise was due chiefly to polymorphonuclears, but subsequently it was brought about mainly by myelocytes. The case may have been one of myelosplenic leukaemia, which is not uncommon in Bengal, in which the condition was overshadowed by the leishmania infection. On the other hand, the condition may be one of the sequelae of kala azar or the antimony treatment.

C. M. W.

CORTÉS (Alonso F.). Los nueve primeros casos de leishmaniosis visceral diagnosticados en la provincia de Cádiz. [**The First Nine Cases of Visceral Leishmaniasis diagnosed in Province of Cadiz.**]—*Medicina Países Cálidos.* Madrid. 1929. July. Vol. 2. No. 4. pp. 352-358. With 9 figs. & 1 map in text. [3 refs.]

An account of nine cases of kala azar in children up to ten years of age which were brought to the antimalaria station at Arcos in the Province of Cadiz. Three of the cases originated in Arcos itself, the others in neighbouring towns. Treatment was carried out with stibenyl alone or this drug combined with Bayer 212.

C. M. W.

NAPIER (L. Everard) & MULLICK (M. N.). **The Intensive Treatment of Kala-Azar by Neostibosan; Part II.**—*Indian Med. Gaz.* 1929. June. Vol. 64. No. 6. pp. 314–315.

In a previous paper (this *Bulletin*, Vol. 26, p. 321) the authors described an intensive course of treatment for kala azar. This consisted in giving eight injections of neostibosan on eight consecutive days, the total amount of drug for an adult being 2·3 gm. The paper under review gives the subsequent history of the patients mentioned in the first paper. Three of the cases could not be traced and one died within six months of some other disease. Of the 26 remaining, three, or 11·5 per cent., are classed as relapses, while 23, or 88·5 per cent., were completely cured. Three of the cases had relapsed after a previous treatment, and of these one relapsed again. Of the 23 which had not been treated previously, two relapsed. The concentrated course has now been adopted as the routine treatment at the Carmichael Hospital for Tropical Diseases in Calcutta. At least 100 more patients have been treated in this way, and on only two occasions has it been necessary to modify the course. As it is likely that the method will be more widely adopted, the authors point out that in half the cases there was no clinical improvement till after the course was completed. It is not claimed that the results are better than the more protracted courses, but that from the point of view of the hospital beds there is a distinct advantage. It is possible that the method might be applied to out-patients, for the full course has been given to two laboratory assistants carrying on their ordinary duties. Though the cure rate is high with eight injections, it seems reasonable to suppose that it might be still higher with ten injections. In the series reported only one case was treated intramuscularly; the patient recovered. The method has now been adopted in about 20 cases and the results have been quite satisfactory. Doses of 0·3 gm. of neostibosan in a 25 per cent. solution in distilled water are injected into the gluteal or deltoid muscles. In only one instance out of about 200 injections was there inflammation followed by abscess formation.

C. M. W.

ROEHL (Wilhelm). **Chemotherapeutic Investigations with Antimony Preparations in the Experimental Kala-Azar of the Hamster.**—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. pp. 563–564. [5 refs.]

In this paper, written shortly before his death, the author describes chemotherapeutic experiments on hamsters infected with *Leishmania donovani*. It was possible to control the action of any drug by performing a weekly liver puncture on the animals. The drugs were given hypodermically. It was found that tartar emetic produced severe necrosis. Antimosan gave a tolerated dose of 1·0 gm. and a minimal curative dose of 0·2 gm. per kilo of body weight. The chemotherapeutic index was 1 to 5. Stibosan gave corresponding figures of 0·7 and 0·15 with an index of 1 to 5 up to 1 to 7. With neostibosan with a tolerated dose of 1·0 gm. the minimal curative dose was 0·02 gm. and the index 1 to 50. The result with neostibosan is in agreement with that of NAPIER and MULLICK (above) in Calcutta in human kala azar. The author points out that the trial of antimony preparations in trypanosome infections in animals has not given any definite clues as to their value for kala azar.

C. M. W.

BOYD (T. C.) & ROY (A. C.). **A Preliminary Note on a Colour Reaction for "693" and its Application in the Estimation of that Compound in the Urine.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. p. 382.

The authors have been attempting to devise a simple colorimetric method for estimating the amount of antimony in the urine of kala azar patients treated with "Bayer 693" (diethyl amine p-amino phenyl stibinate). After many trials the following procedure was found to give the best effect.

A standard solution is prepared by dissolving the drug in normal urine (usually a 1 in 10,000 solution). The standard solution and the urine to be tested are both treated as follows. To 0.5 cc. or more one drop of dilute hydrochloric acid is added and then 1.5 cc. of water and the mixture cooled on ice. After about ten minutes one drop of a 1 per cent. solution of sodium nitrite is added mixed and the test tubes again cooled on ice for about a minute. Then 1 cc. of about 1 per cent. solution of β -naphthol in 20 per cent. caustic soda is added and mixed. The red colour formed is allowed to develop for about five minutes. The colour of the patient's urine is compared with that of the standard solution in a test-tube colorimeter.

C. M. W.

YOUNG (Charles W.), HERTIG (Marshall) & LIU (Pao-Yung). **The Kala Azar Transmission Problem: Field and Laboratory Studies in China. II. Susceptibility of Various Rodents to Infection with *Leishmania donovani*.**—*Amer. J. Hyg.* 1929. July. Vol. 10. No. 1. pp. 183-200. [9 refs.] [Harvard Med. School, Boston, & Peking Union Med. College, Peking, China.]

The authors, the first of whom, regrettably, died before publication of this paper, give a detailed account of inoculation experiments on animals with strains of *Leishmania donovani* from cases of Chinese kala azar. The material used for inoculation was the ground-up liver and spleen of a heavily infected striped hamster, diluted with Locke's solution to give 10 cc. of emulsion. As a rule each animal was given 0.5 cc. of this standard emulsion by intraperitoneal inoculation. In most series inoculated a certain number of animals die as a result of the inoculation. The death rate from this cause is higher amongst animals which are difficult to keep alive in captivity. In judging the results these have to be excluded. Of 105 giant hamsters (*Cricetulus triton*) inoculated 97 lived over 10 days, and of these 79 became infected. The number of negatives—18—is unduly high, since 13 of them were in one batch of 39. There is a slight tendency to natural recovery from the infection. Of voles (*Microtus* sp.) 11 were inoculated and eight were found to be infected. Seven of these animals received 1.0 instead of 0.5 cc. of the standard dose. Ten house rats (*Mus rattus*) were inoculated and all became infected. Of 134 house mice (*Mus wagneri*) 96 were positive. The dose was 0.25 cc. Of the 38 negatives 32 died within 20 days of the inoculation. Of 20 white rats (*Mus norvegicus albinus*) one series of 10 inoculated with from 1.4 to 2.7 cc. gave seven infections, but few parasites were present. The second series of 10 were inoculated with 1.0 cc. Three of the animals died immediately, but the seven remaining became moderately or heavily infected. The difference between the two series indicates that the white rat gives uncertain results. Of 44 white mice (*Mus musculus albinus*) receiving 0.5 cc. 37 became slightly

or moderately infected. Of 1,661 striped hamsters (*Cricetulus griseus*) 1,487 were positive. If 95 negatives which died within the first 20 days after inoculation are excluded, the infection rate is about 95 per cent. HINDLE, basing his conclusion on single lots of 12 hamsters for each of five strains of *Leishmania donovani*, stated that they differed in virulence. After an experience with much larger numbers of animals the authors find no variation in virulence between different strains. In the striped hamster the proportion of heavy infections is much greater than with any other animal. There is a tendency to recovery as shown by the fact that out of 887 which were positive by liver puncture during life 20 were negative at autopsy. During the period from 41 to 70 days after inoculation there were only two negatives out of 207 autopsies.

As it was realized that in attempts to transmit kala azar by the bites of insects only small doses of the virus were administered, it was determined to test the result of inoculating minimal numbers of parasites. To this end a series of experiments was carried out with the standard solution diluted from 1:10 up to 1:10¹⁴. Though the hamsters inoculated with the highest dilutions received very few organisms infections occurred, for four out of ten were positive. The time required for infection to develop was greatly increased by the minimal doses, but it was shown that after 150 days the infections were comparable with those resulting from heavy doses. It was shown by the authors that striped hamsters become infected after intraperitoneal injection of cultures. Of 5 animals thus inoculated all became infected. In a series of scarification experiments with parasites from the organs of infected animals 18 out of 63 became infected, while with similar experiments made with cultures 7 out of 37 animals were positive. In these scarification experiments the course of the infections resembled those produced by the intraperitoneal inoculation of minimal doses. As regards feeding experiments, the ingestion of countless numbers of parasites by striped hamsters has not resulted in infection.

C. M. W.

SHORTT (H. E.), CRAIGHEAD (A. C.), SMITH (R. O. A.) & SWAMINATH (C. S.). **The Infection of Hamsters with Kala-Azar by the Oral Route.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 335-338. [1 ref.]

In a previous paper (this *Bulletin*, Vol. 26, p. 323) the authors showed that hamsters could be infected with *Leishmania donovani* by the oral and conjunctival routes. In the paper under review an account is given of further experiments in which hamsters were infected by the oral route with parasites from the spleen and liver of other hamsters or with cultural forms. Of 10 animals given one dose of parasites from the liver and spleen eight became infected, and of six given orally from 57 to 88 doses of culture three became infected. These results prove that the assumption that the parasites, whether in the leishmania or leptomonas form, could not survive in the intestine because of the presence of bacteria is incorrect in spite of the fact that it is known that they will not survive with bacteria in the culture tube or in the sand-fly. The hypothesis of oral infection in kala azar is thus reopened and the obvious line of future work will be to determine the avenue by which viable forms of *L. donovani* may leave the mammalian host. The authors say that it is with reluctance that they re-open this question in the face of the strong circumstantial evidence tending to incriminate

Phlebotomus argentipes, but they do not mention the possibility of oral contamination with the flagellates in the sandflies which have ingested the mammalian forms of the parasite.

C. M. W.

MAJUMDAR (Akhil Ranjan). **A Simple Blood-Test for the Diagnosis of Kala-Azar (Preliminary Report).**—*Calcutta Med. Jl.* 1928. June. Vol. 22. No. 12. pp. 643-648.

The author describes a simple method for carrying out the aldehyde test for kala azar. In a small tube like a Dreyer's tube is placed $\frac{1}{2}$ cc. of a 4 per cent. solution of urea stibamine. With a pipette less than a drop of blood is taken from the finger and thoroughly mixed with the solution in the tube. The mixture should have merely a faint red colour. The tube left standing in the vertical position shows in an hour in positive cases a flocculent precipitate which falls to the bottom of the tube.

C. M. W.

GEORGIEWSKY (A.). Die Komplementbildung [sic] bei innerlicher Leishmaniose des Menschen und Hundes. [**Complement Fixation in Visceral Leishmaniasis of Man and Dog.**—*Pensée Méd. d'Usbékistane.* Tashkent. 1927. Dec. No. 3. pp. 80-84. [8 refs.] [In Russian. German summary p. 137.]

As antigen the author employed alcoholic extracts of the dried liver from cases of human and canine kala azar. Sera were taken from cases of human and canine kala azar and as controls from cases of malaria and syphilis and healthy dogs. It was found that the antigen in presence of the leishmania serum could to a certain extent cause fixation of the complement, but this was also the case when malarial and syphilitic sera were substituted. The antigen was therefore not specific for a leishmania infection. On the other hand, with syphilitic antigen the leishmania sera did not bring about fixation of the complement.

C. M. W.

DE CAPUA (F.). Alterazioni del sistema reticoloistocitario nella leishmaniosi infantile. I. Le cellule endoteliali nel sangue periferico dei bambini leishmaniotici. [**Changes in the Reticulo-Endothelial System in Infantile Leishmaniasis.**—*Pediatria.* 1929. Aug. 15. Vol. 37. No. 16. pp. 869-880. With 4 figs. on 2 plates & 19 figs. on 1 coloured plate. [21 refs.] [Inst. Clin. Pediatrics, Univ., Naples.]

In a case of infantile kala azar it was noted that large numbers of endothelial cells were present in the blood. At one stage they represented 26 per cent. of the white cells. Under treatment with tartar emetic and consequent improvement the endothelial cells in the blood diminished in number. Though 10 per cent. of these cells contained red blood corpuscles, not one was found containing leishmania. An examination of spleen pulp and bone marrow showed that there was a hyperplasia of the reticulo-endothelial system which

resulted in a great outpouring of endothelial cells into the circulation. Leishmaniasis can thus be regarded as a definite parasitic blocking of the reticulo-endothelial system.

C. M. W.

MESSIK (R. E.). Zur Frage der genetischen Beziehungen zwischen *Leishmania tropica* und *Leishmania donovani*. [**Genetic Relations between *L. tropica* and *L. donovani*.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 63. No. 3/4. pp. 327–336. [14 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R. Moscow.]

The author has investigated the adhesion phenomenon in mice immunized with two strains of *Leishmania tropica* and two of *L. donovani*. The four strains showed similar antigenic properties, and the titre of the thrombocytobarine produced by one strain was the same for it as for the other strains. Similarly, the change in growth produced by the addition to culture medium of immune serum of various dilutions showed a parallel with the thrombocytobarine production and was similarly not specific for any strain. The results indicate that all strains of leishmania have similar antigenic properties.

C. M. W.

DA FONSECA (Flavio). Possibilidade de infecção do camundongo branco com a *Leishmania brasiliensis* Vianna, 1911. [**Infection of White Mouse with *L. brasiliensis*.**—*Bol. Biol. S. Paulo.* 1929. June 30. No. 15. pp. 18–19. [Microbiol. Lab., Faculty of Med., S. Paulo.]

Of 46 white mice inoculated with *Leishmania brasiliensis* only one became infected. This was an animal which was inoculated into the vagino-peritoneal recess with an eleven-day-old first subculture of the parasite. Death took place on the 70th day and leishmania were found in smears from the liver.

C. M. W.

MU (Jui-wu) & HUIE (Dorothy). **Specificity of the Kahn Reaction in Kala-Azar.**—*Nat. Med. J. China.* 1929. Aug. Vol. 15. No. 4. pp. 436–439. [15 refs.] [Peking Union Med. College, Peking, China.]

Forty-one sera from 37 cases of kala azar in N. China were examined by the Kahn test in parallel with Kolmer's Wassermann reaction. The cases varied in duration from one month to four years. Of the 37 cases only 3 gave a positive Kahn test and in these the Wassermann test gave a similar result. In 2 of the 3 cases there was evidence of syphilis, while in the third the test was negative when repeated. It thus appears that the specificity of the Kahn test was not affected by the high globulin content of the serum which is characteristic of kala azar. High fever, when it occurred, likewise did not alter the reaction.

C. M. W.

CHOPRA (R. N.) & CHOUDHURY (S. G.). **Studies in Physical Properties of Different Blood Sera. Part III. Viscosity.**—*Indian J. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 939-945. [18 refs.] [Calcutta School of Trop. Med. & Hyg., Calcutta.]

Since in higher animals the blood circulates through a complex network of tubes, it is obvious that the viscosity of blood and serum must be a matter of some importance. Though much work has been done on the viscosity of normal blood, little attention has been paid to pathological conditions. The authors have investigated by the ordinary flow methods sera from cases of kala azar, syphilis, tuberculosis and leprosy. The highest values were obtained for kala azar sera and those from advanced cases of tuberculosis, but an increase above normal is also shown by syphilitic sera. Those of cases of leprosy gave divergent values. The increase is attributed to a relative increase in the globulin content, exceptionally high values being due to a relative increase in euglobulin. It has further been noted that a serum showing higher viscosity exhibits diminished buffer action and lower surface tension.

C. M. W.

CHODOUKINE (N. I.). Essais d'infection des phlébotomes par *Leishmania canis* (Nicolle). [**Experiments of Infection of Phlebotomus with *L. canis*.**]—*Pensée Méd. d'Usbékistane*. Tashkent. 1927. Dec. No. 3. pp. 53-68. With 2 plates. [47 refs.] [In Russian. French summary p. 135.]

Working in Tashkent with *Phlebotomus perniciosus*, *P. sergenti* and *P. papatasi* the author has produced infection in 2.8 per cent. of 398 flies by feeding them on the ears of a dog suffering from generalized leishmaniasis. The flies used were wild ones, but natural infection was excluded by the examination of 164 as controls with negative results. Furthermore, during the past two years over 500 wild flies from Tashkent and Bokhara have been dissected without a single naturally infected fly being discovered. The flagellates were first found on the fourth day, the flies having been kept at a temperature of 13° C. to 28° C. in a humid atmosphere. The flagellates were found in the pharynx, oesophagus and upper part of the intestine up to the 11th day, after which signs of degeneration appeared.

C. M. W.

LO PRESTI-SEMINERIO (F.). Considerazioni su ventuno casi di leishmaniosi infantile. [**Twenty-One Cases of Infantile Leishmaniasis.**]—*Pediatria*. 1929. Aug. 1. Vol. 37. No. 15. pp. 813-827. [21 refs.]

The paper describes the clinical features of 21 cases of infantile kala azar studied by the author in Agrigento, a town on the south coast of Sicily.

C. M. W.

FANANO (Vincenzo). Su di un caso di leishmaniosi interna infantile. [**Case of Infantile Leishmaniasis.**]—*Policlinico*. Sez. Prat. 1929. July 29. Vol. 36. No. 30. pp. 1069-1072. [14 refs.] ["Bambin Gesù" Children's Hosp., Rome.]

The paper records a case of kala azar in a child of three in Rome. Infection took place in San Remo. Treatment with tartar emetic was successful.

C. M. W.

PANGALOS (Georges Const.). Un cas de leishmaniose infantile avec gangrène de la machoire inférieure. [**Case of Infantile Leishmaniasis with Gangrene of Lower Jaw.**—*Grèce Méd.* 1929. May-June. Vol. 31. No. 5-6. p. 17. With 1 text fig. [3 refs.]

A case of kala azar in a child six years of age. The disease appears to have been contracted in Salamis, from which cases have not hitherto been recorded.

C. M. W.

SCHÉWTSCHÉNKO (Ph. I.). Sur le mode de conservation de cultures des corpuscules de Leishman. [**Means of Preservation of Cultures of Leishmania.**—*Pensée Méd. d'Usbékistane.* Tashkent. 1927. Dec. No. 3. pp. 74-79. [In Russian. French summary pp. 136-137.]

A comparison of various media which have been employed for the cultivation of leishmania, with suggestions for their improvement.

C. M. W.

CANAAN (T.). **The Oriental Boil: an Epidemiological Study in Palestine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. June 25. Vol. 23. No. 1. pp. 89-94. [2 refs.]

Since the war cases of oriental sore have occurred in Palestine in places other than Jericho, which was previously regarded as the only endemic focus in this country. In some instances association with individuals who had contracted the disease in Jericho was proved to have occurred, and the author concludes that since the war there has been an actual introduction of oriental sore into localities previously free. He does not think that any cause other than the sandfly is responsible for the infection, and explains the fact that in Aleppo oriental sore is much more common than in Jericho by the greater incidence of infected sandflies in the former. The fact that in 78.5 per cent. of the cases the eruption first appeared in the summer months while in the remaining 21.5 per cent. it appeared in the autumn or early winter is explained by the theory of sandfly transmission, for in Jericho these flies do not occur or are very rarely seen between the end of December and the beginning of April. People who visit Jericho in the day time only do not as a rule become infected. In three cases there had been a stay of only a few days, and in these the incubation periods were four, five and six weeks. The author mentions his experience in Aleppo, where he found that 187 of 191 children belonging to 38 families had been infected in infancy. Of 50 Europeans who had spent at least two successive years in Aleppo only seven had been attacked. In Aleppo it would seem that children with more delicate skins than adults are more susceptible. In Jericho, however, many adults become infected. In Aleppo an infection with few lesions is the rule, the number only exceptionally exceeding six to ten. In Jericho the author has seen 55 in one patient, while in another the thin hairy scalp was full of papules, while the face and extremities were also covered with small and large eruptions. The author believes that every main eruption is due to a separate sandfly bite. Around the main lesion, however, may occur one or more small papules which probably indicate an extension by way of the lymphatics.

C. M. W.

Buss (G.). Die amerikanische Hautleishmaniose. [**American Dermal Leishmaniasis.**—*Arch. f. Dermat. u. Syph.* 1929. Aug. 10. Vol. 158. No. 1. pp. 202-222. With 10 text figs. [22 refs.]; pp. 223-265. With 10 text figs. [1 page of refs.]

The paper gives the results of a histological study of 62 cases of South American cutaneous leishmaniasis and is based on 94 pieces of tissue removed from the patients. In only 51 of these pieces was it possible in section to demonstrate leishmania, though all the cases were clinically characteristic of the disease. In only three cases were the parasites found to be numerous. It thus appears evident that in the S. American disease the parasites are present in much smaller numbers than is the case with oriental sore. The suggestion is made that parasitic foci originate from the blood vessels, which are of importance from the point of view of the character and course of the disease and may account for invasion of the mucosae. As a rule the formation of tuberculoid tissue is seldom seen and is a less important feature than it is in oriental sore. In late stages of the disease tissue resembling tubercles may occur, while in about one-third of the cases giant cells were found.

C. M. W.

CHACÓN (Arnoldo Iachner). **Cutaneous Leishmaniasis.**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 183-185. [United Fruit Co. Hosp., Limon, Costa Rica.]

It is pointed out that the frequent incidence of cutaneous leishmaniasis in Central America has not been reported until recently. In the hospital from which the author writes 20 cases have been seen during the year and he states that microscopic examination reveals the fact that 40 to 50 per cent. of all ulcers seen are cases of leishmaniasis. The recognition of the cause is important, for ulcers due to spirilla respond to arsenical treatment, whereas those due to leishmania react to antimony. The clinical aspect of the ulcers is that of the phagedenic type, and they are more commonly observed on the legs than elsewhere, especially in the middle and lower thirds. Ulcers of the face and the toes are, however, not uncommon. Treatment consists of local applications to rid the ulcers of bacterial infections and internal administration of antimony. The intravenous injection of tartar emetic in doses of 0.08 gm. to 0.1 gm. has given excellent results.

C. M. W.

REYNOLDS (D.). **A Mild Form of Tropical Sore.**—*Jl. Roy. Army Med. Corps.* 1929. Oct. Vol. 53. No. 4. p. 288.

During the autumn and winter of each year there is seen in Ismailia, Moascar and Abu Sueir a type of indolent sore which resembles mild cutaneous leishmaniasis. Though no leishmania have been found on microscopical examination, the best treatment for the condition is the applications of a 2 per cent. tartar emetic ointment in the morning and evening for two days, followed by a hot boric fomentation for 12 hours, after which a simple dressing with lotio rubra is employed till a healthy scab is formed.

C. M. W.

NUTTER (R. B.). **Oriental Sore.**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 191–192. With 1 text fig. [Tela Railroad Co. Hosp., Tela, Honduras.]

Cases of cutaneous leishmaniasis are not infrequently seen, but the case recorded with two ulcers on the left hand is the first noted with multiple lesions. Intravenous injections of 1 per cent. solution of tartar emetic every third day, beginning with 1 cc. and increasing to 4 cc., have given satisfactory results. The advantages of preparing a fresh solution for each injection or the disadvantages of sterilizing the solution by boiling have not been apparent.

C. M. W.

VIGNE, ASSADA & AUDIER. Double bouton d'Orient de la face. [**Double Oriental Sore of the Face.**]—*Marseille-Méd.* 1929. Sept. 25. Vol. 66. No. 27. pp. 380–381.

Note of a case of oriental sore in an Arab from Algeria who noted the first signs of the disease a month after arrival in Marseilles. There were two sores on the face which had improved considerably in a fortnight after administration of treparsol in dose of 1 gm. daily with a rest of three days after each fourth injection.

C. M. W.

DOSTROWSKY (Arje). Zur Behandlung der Leishmaniosis cutanea. [**Treatment of Dermal Leishmaniasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Aug. Vol. 33. No. 8. pp. 417–423. [4 refs.] [Rothschild Hosp., Hadassah Med. Organization, Jerusalem.]

Having dealt with over 200 cases of oriental sore in Palestine, the author discusses the treatment, basing his remarks on 70 cases which he had followed carefully. The disease has a distinct tendency to be self-healing and popular opinion is not in favour of any active interference. In Jericho it is believed that the duration is months and in other localities one year. The treatment adopted by the natives is the application of the leaf of some plant. This has the effect of producing a moist chamber in which healing occurs. A similar state of affairs exists when an ointment is applied. Though in many cases a sore will heal in the usual time, not a few cases last longer and many show progressive ulceration. One case quoted had a history of 2½ years. Mention is made of the experimental inoculations made by ADLER and THEODOR. In these cases the resulting sores healed spontaneously in from 3 to 17 months. Thus in no case is it possible to predict what will be its duration. In the treatment of a disease in which spontaneous cure followed by immunity occurs, the assistance of the natural processes should be aimed at. On this account an active immunization would be the ideal treatment. Ten cases were treated with a vaccine, and in two of these the nodules and ulcers, which were of 2 to 3 months' duration, as also the enlarged lymphatic glands, disappeared after the fourth injection. In the others the course of treatment was not completed. The commencing dose contained half a million parasites. In some cases painful sterile abscesses developed at the site of the inoculations. In spite of the defects, it would seem that the rapid action in the two cases is an indication that the method, if improved, will be of value.

Nine cases were treated with salvarsan and healing occurred in 45 to 90 days. One case, a girl with 158 nodules, showed no improvement after 6 injections of neosalvarsan. A cure was effected after

10 injections of tartar emetic. Another patient, from Bokhara had a sore on the dorsum of the right hand with a history of 2½ years. There was resistance to salvarsan and Röntgen rays, but cure following tartar emetic. With antimony therapy the greatest number were treated. No case resisted tartar emetic, healing occurring on the average in 90 days. Intramuscular injection of antimosan in two cases was not satisfactory. Tartar emetic undoubtedly gives good results with little disfigurement. Occasionally, when a 2 per cent. solution was used, in spite of correct administration, there was pain along the course of the vein. Of 30 cases treated with Röntgen rays only 1 was refractory. The treatment lasted from 30 to 120 days. The dose at present employed is 1 HED (Holsnecht erythema dose) in 2 applications with a week's interval. It has been noted that repeated small doses cause the sore and surrounding tissues to swell and become hyperaemic, while with a higher dose the sore disappears without any swelling. The resulting scarring appears to be more disfiguring than after the methods of treatment mentioned above. In Röntgen ray treatment it is necessary to discover the smallest dose which will bring about rapid healing without damage to the healthy tissues. With carbonic acid freezing 10 cases were cured in 60 to 90 days. There were 6 or 7 applications of 10 to 15 seconds. Not all patients, however, will submit to this painful treatment.

In order to compare accurately one form of treatment with another it would be necessary to treat in one patient similar sores of like duration. As this is not possible, care must be taken that the comparisons are made between cases in which the stage of the disease and the types of sore are the same. In a small series of cases in which the sores were of the non-ulcerating type the following results were obtained. With Röntgen rays 3 cases were cured in 1½ to 2 months, 3 months and ½ month respectively; with antimosan 1 case was cured in 1½ month and two failed in 2 months and 1 month; with tartar emetic 2 cases were cured in 4 and 3 months; with salvarsan 2 cases were cured in 3 months and 1 case had not responded in 2 months. Though the cases are few in number, it is clear that the duration of the disease had been very much shortened. The best method is that of Röntgen rays. It is rapid, there is the least waste of time for the patient and it is painless. On the other hand, it is expensive and is not always available. Where Röntgen rays cannot be employed the best treatment is by CO₂-snow or antimony. The author believes, however, that with improved technique vaccine therapy will give good results.

C. M. W.

VIGNE (Paul) & FOURNIER (A.). Le traitement du bouton d'Orient. A propos de quelques cas personnels. [**Treatment of Oriental Sore.**—*Rev. Prat. Malad. des Pays Chauds*. 1928. Aug. Year 7. Vol. 8. No. 8. pp. 412-419. [31 refs.]

The authors have had the opportunity of studying numbers of cases of oriental sore in Armenians on their arrival in Marseilles. After trying many of the treatments which have been recommended and which are mentioned in the paper, it was found that intramuscular injections of 3 cc. of iodobismuthate of quinine gave the best results. After 15 to 20 injections a cure is usually obtained. This treatment is now adopted for all cases. ESCOMEL has reported good results after the use of this drug in South America. When the sore is small and in

an area with loose skin it may be safely removed surgically. Other sores may be cleaned up with moist antiseptic dressings and treated by radiotherapy, or if this is not available with permanganate of potash powder following curetting.

C. M. W.

VATCHAGHANDY (Sorab Bappji). **A Persian Treatment for Oriental Sore.**—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. p. 572.

The treatment which was used by the author with success in one case consists in the daily application of an ointment consisting of one part of red oxide of antimony and four of "aishnoo" with yolk of egg. The "aishnoo" is a powdered Persian plant which is employed by the natives as a substitute for soap. In an editorial note it is suggested that the substance is of the nature of soap-nut, which contains large quantities of irritating saponins.

C. M. W.

PARROT (L.). Notes sur la leishmaniose expérimentale (*Leishmania tropica*) de la souris blanche. [**Experimental Leishmaniasis (L. tropica) of the White Mouse.**]—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 453-464. With 1 plate. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

Seven culture strains of *Leishmania tropica* of Algerian origin have all proved to be infective for mice when inoculated intraperitoneally, intratesticularly or subcutaneously or cutaneously in the tail. After the first two methods of inoculation there is a rapidly developed generalized infection followed by secondary cutaneous lesions, ulceration around the ears and tail, scrotal ulceration, adenitis, arthritis and peri-arthritis. When injected into the tail the cultures produce lesions resembling oriental sore in man. After long maintenance in subculture three strains definitely depreciated in virulence for mice. The infectivity for mice was not correlated with the presence of the round forms (O-bodies of Row). The results indicate that the flagellate forms alone are infective. Attempts were made to vaccinate mice against infection by the use of strains which had lost their virulence. Of 12 mice which received repeated injections of non-virulent cultures 10 were subsequently infected with a virulent strain. The two which did not become infected behaved as if they were immune. With cultures killed with formalin no protection was given. Of 15 mice inoculated repeatedly with cultures of the non-virulent leptomonas of the gecko 12 were found to be not immune when inoculated with *L. tropica*. One of the three which resisted infection on two occasions was infected a year later. The general conclusion is that immunity was not conferred by the vaccination procedures employed.

C. M. W.

MAZZA (Salvador) & NIÑO (Flavio). Notas hematológicas y serológicas sobre leishmaniosis tegumentaria americana. [**Hæmatological and Serological Notes on American Dermal Leishmaniasis.**]—*Prensa Méd. Argentina.* 1929. June 10. 15 pp. [11 refs.] [Inst. of Clin. Surg., Univ., Buenos Aires.]

In the northern province of Brazil, where cutaneous leishmaniasis is of frequent occurrence, the authors examined 4 or 5 films of the

peripheral blood of 392 cases in all stages of the disease. In no case were leishmania seen. From 35 of these cases cultures were made from the peripheral blood, but these likewise gave negative results. In the majority of the cases parasites were found in material taken from the lesions. In 65 cases the leucocytes of the blood were investigated. There was a definite increase in the mononuclear cells. In the peripheral blood there was an average mononuclear count of 41 per cent. and of these 36 per cent. were lymphocytes. In blood taken from the region of the sore the figures were 48 and 45. In the peripheral blood there were on an average 6 per cent. of eosinophiles. As regards the Wassermann reaction, it was negative except on rare occasions. The formol-gel test and the serum-water test, which give positive results in kala azar, were negative.

C. M. W.

MESIK (P. E.). Sugli anticorpi in riguardo alle Leishmanie. [**Antibodies in respect to Leishmania.**]—*Giorn. di Batteriol. e Immunol.* Turin. 1928. Apr. Vol. 3. No. 4. pp. 225-244. [12 refs.] [Bact. Inst., II. State Univ., Moscow.]

During the process of immunization of rats with cultures of *Leishmania tropica* there appear in the blood, in addition to thrombocyto-barines, antibodies capable of producing fixation of complement and lysins. The antibodies and lysins are strictly specific for the corresponding antigen and show no action with trypanosomes. There is a definite parallel between the production of thrombocyto-barine and antigen and an antagonism between the former and lysins. During immunization neither agglutinins nor precipitins are found.

C. M. W.

TKESCHELASCHWILI (K.) & TSCHILINGAROFF. [Leishmaniosis cutanea in Georgien.] [**Dermal Leishmaniasis in Georgia.**]—*Nachrichten der Tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 5. pp. 327-331. With 1 text fig. [9 refs.] [In Georgian script. German summary p. 409.]

The discovery of three cases of oriental sore in natives of the Gori district and two in natives of Tiflis proves that the disease is endemic in Georgia. Hitherto it has been supposed that all cases were introduced from elsewhere.

C. M. W.

DE BUEN (S.). Dos nuevos casos de boton de Oriente en Andalucia. [**Cases of Oriental Sore in Andalusia.**]—*Medicina Paises Cálidos.* Madrid. 1929. Sept. Vol. 2. No. 5. p. 450.

A record of two cases of oriental sore in children in Spain.

The first was from the district of Motril in the province of Granada, from which cases have already been reported, while the second was from the neighbourhood of Arcos. Both cases were diagnosed by the discovery of leishmania, while the second is the first to be reported from the province of Cadiz.

C. M. W.

CÉARD (L.). Sur un nouveau foyer de bouton d'Orient constaté dans le Sahara oranais. [**New Focus of Oriental Sore in the Sahara.**—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 465-467. [3 refs.] [Pasteur Inst. of Algeria, Algiers.]

The discovery of two cases of oriental sore at Ksar Abadla, has extended to latitude 31° N. the endemic area of this disease in the Sahara.

C. M. W.

JOYEUX (Ch.). Travaux récents sur les leishmanioses cutanées. [**Recent Work on Dermal Leishmaniasis.**—*Rev. Prat. Malad. des Pays Chauds.* 1928. Dec. Year 7. Vol. 8. No. 12. pp. 608-619.

A general review which gives no new information.

C. M. W.

RELAPSING* FEVER.

- i. DELANOË (P.). Contribution à l'étude du spirochète marocain, *Sp. hispanicum* var. *marocanum* Ch. Nicolle et Ch. Anderson, 1928. [**Study of the Moroccan Spirochaete *S. hispanicum* var. *marocanum*.**—*Arch. Inst. Pasteur de Tunis*, 1929. June. Vol. 18. No. 2. pp. 133–162. With 1 map, 2 charts & 2 figs. on 1 plate. [3 refs.] [District Hosp., Mazagan.]
- ii. NICOLLE (Charles), ANDERSON (Charles) & HORNUS (Pierre). Etude d'un spirochète du groupe *Sp. hispanicum* S. de Buen, isolé d'un cas de fièvre récurrente marocaine. [**Study of a Spirochaete belonging to the Group *S. hispanicum* S. de Buen, isolated from a Case of Moroccan Relapsing Fever.**—*Ibid.* pp. 163–187. With 1 chart in text. [6 refs.]
- iii. — & —. Note au sujet des deux précédents mémoires. [**Note on the Two Preceding Memoirs.**—*Ibid.* pp. 188–198. [2 refs.]

i. The author has collected *Ornithodoros* (*O. marocanus*) in Morocco from pigsties, the burrows of porcupines and fox holes. The ticks from the latter sites were more often infected with spirochaetes than those from pigsties. All the inoculation tests are given in detail.

ii. The second paper comprises a detailed account of an experimental study of a strain of Moroccan relapsing fever isolated from a man, who acquired the infection as the result of being bitten by *Ornithodoros*.

iii. The last paper is a discussion of the problem of relapsing fever in Morocco in which the authors reaffirm their view that the small rodents constitute the main reservoir of the infection, and bring forward lengthy arguments in support of this theory.

E. Hindle.

DELANOË (P.). Les spirochètes marocains des *Ornithodores* des terriers et le spirochète de Mansouria ne sont pas doués de récurrence pour l'homme. Ils constituent une espèce distincte du spirochète espagnol, *Sp. hispanicum* S. de Buen 1926. [**Moroccan Spirochaetes of *Ornithodoros* from Burrows and the Spirochaete of Mansouria do not cause Relapses in Man. They constitute a Distinct Species from the Spanish Spirochaete, *Sp. hispanicum* S. de Buen 1926.**—*C.R. Acad. Sci.* 1929. Sept. 2. Vol. 189. No. 10. pp. 398–400. [2 refs.]

The author isolated a strain of spirochaetes from *Ornithodoros* collected from the burrows of porcupines in Morocco. This strain was pathogenic to guineapigs, and three men inoculated with guineapig blood containing numerous spirochaetes showed a slight rise in temperature on the 8th day which lasted for about 2 days. Spirochaetes were found in the blood in very scanty numbers during this period but no relapses occurred and the cases recovered without treatment. Similar results were obtained in two natives inoculated with a Mansouria strain of spirochaetes obtained from NICOLLE. One of the cases that had recovered from infection with the Moroccan strain was found to be immune against the Mansouria strain and from

their general resemblance the author concludes that these two are identical. At least three strains of relapsing fever may occur in Morocco.

- (1) *S. recurrentis*, causing the ordinary European relapsing fever.
- (2) *S. hispanicum*, S. de Buen, or a related form, causing the Spanish type of relapsing fever.
- (3) *S. marocanum* Nicolle and Anderson, *emend.* Delanoë, causing a mild non-relapsing type of fever.

E. H.

NICOLLE (Charles), ANDERSON (Charles) & COLAS-BELCOUR (Jacques). Sur les rapports du spirochète récurrent marocain *Sp. hispanicum* var. *marocanum* avec le porc-épic. [**On the Relation of Moroccan Relapsing Fever, *S. hispanicum* var. *marocanum*, with the Porcupine.**—*C.R. Acad. Sci.* 1929. July 29. Vol. 189. No. 5. pp. 224–226. [2 refs.]

The authors previously advanced the view that the common small rodents act as reservoirs of this infection in Morocco. DELANOË [see above] suggested that the porcupine might be the reservoir, but as this animal is comparatively rare and lives in the mountains away from human habitations it does not seem such a likely host as the common small rodents. Three of these animals were inoculated with this strain of spirochaetes by DELANOË and found to be resistant, but these results were explained as possibly due to immunity acquired as the result of a previous infection. The authors have recently obtained a young porcupine which when inoculated with this strain showed a few spirochaetes in its blood on the 9th and 10th days and died the following day. Its blood was infective to other susceptible animals; consequently the porcupine may be of some significance as a natural reservoir of this disease, but its importance is only secondary to that of the more common rodents.

E. H.

- i. REMLINGER (P.) & BAILLY (J.). Animaux réceptifs au spirille de la fièvre récurrente marocaine: (*Spirochaeta hispanicum* var. *marocanum*, souche Tetuan), et animaux réfractaires. [**Animals susceptible to Infection with the Spirochaete of Moroccan Relapsing Fever (*S. hispanicum*, var. *marocanum*, Source Tetuan) and Animals Refractory.**—*C.R. Soc. Biol.* 1929. Nov. 15. Vol. 102. No. 30. pp. 508–509.
- ii. — & —. Principaux modes d'inoculation du spirille de la fièvre récurrente marocaine: (*Spirochaeta hispanicum* var. *marocanum*, souche Tetuan). [**The Principal Methods of Inoculation of the Spirochaete of Moroccan Relapsing Fever (*S. hispanicum*, var. *marocanum*, Source Tetuan).**—*Ibid.* pp. 505–507. [Pasteur Inst. of Morocco, Tangiers.]
- i. The first paper in addition to confirming previous observations by NICOLLE and ANDERSON [see this *Bulletin*, Vol. 25, p. 586], in particular the invariable susceptibility of the guineapig, contains records of attempts to infect other animals. The hedgehog, wild rats and wild mice were readily infected, also with difficulty rabbits, young dogs, and in one case a kitten of 3 months old. Adult cats were refractory. The jackal, fowl, pigeon, martin, tortoise, frog, and fishes were inoculated in various ways but were completely refractory.

ii. The second paper is a discussion of the various methods of inoculation and the results obtained by their use. Susceptible animals were infected by all the usual methods, including percutaneous inoculations; also by the introduction of infected blood into the stomach or rectum. In view of the fact that all conjunctival membranes allowed the passage of virus the authors recommend the placing of a drop of infected blood in the nose or on the conjunctiva in order to produce infection in paralytic patients receiving pyretic treatment by the aid of this organism.

E. H.

REMLINGER (P.) & BAILLY (J.). Siège du virus récurrent hispano-marocain (*Spirochaeta hispanicum* var. *marocanum*, souche Tetuan) chez les animaux artificiellement infectés. [**The Site of the Virus of Spanish-Moroccan Relapsing Fever (*Spirochaeta hispanicum* var. *marocanum*, Source Tetuan) in Experimentally Infected Animals.**—*C.R. Soc. Biol.* 1929. Nov. 22. Vol. 102. No. 31. pp. 548-550. [Pasteur Inst. of Morocco, Tangiers.]

The authors found that the virus may be present in the urine of guineapigs infected with *S. hispanicum* var. *marocanum*. The urine of 2 out of 6 animals, at the height of the infection, when inoculated into normal guineapigs reproduced the disease. The marrow of the femur was also found to contain the infection. The aqueous humour contained the virus in a virulent form, either visible or non-visible, but the vitreous humour was always negative. The milk and bile also gave negative results. The brain of guineapigs was found to be infective at least 60 days after the disappearance of spirochaetes from the circulation. In refractory animals, such as pigeons, the intracerebral injection of spirochaetes resulted in their persistence in the brain for considerable periods up to 23 days in one instance. The spirochaetes were found to disappear from the circulation and organs very rapidly towards the end of the disease and sometimes they could not be detected in the films made from animals that had died overnight and were heavily positive the previous evening. Nevertheless, although these cadavers were negative to microscopic examination, the virus was found to persist in the liver and brain for 48 to 50 hours after death, as determined by inoculation into other animals. Defibrinated blood containing spirochaetes when kept in glass pipettes at the room temperature was found to keep its virulence for at least 12 days. The authors consider that their observations on this organism support NICOLLE's view that there is an invisible pathogenic stage and that the visible spirochaete is merely a return to the ancestral saprophytic form.

E. H.

NICOLLE (Charles) & ANDERSON (Charles). Les spirochètes récurrents marocains du groupe *hispanicum* ne sont pas séparables en espèces. [**Moroccan Relapsing Fever Spirochaetes of the *hispanicum* Group cannot be divided into Species.**—*C.R. Acad. Sci.* 1929. Nov. 18. Vol. 189. No. 21. pp. 817-819.

The authors find that all the strains of Moroccan relapsing fever, including the one from Mansouria [see above p. 106], belong to the same species *S. hispanicum*, and are all transmitted by ticks.

E. H.

NICOLLE (Charles) & ANDERSON (Charles). Indifférence des spirochètes récurrents pour leurs hôtes du genre *Ornithodore*. [**Relapsing Fever Spirochaetes in relation to Species of the Genus *Ornithodoros*.**]—*Acta Med. Scandinavica*. 1929. Vol. 70. No. 5/6. pp. 392–395.

The authors summarize their interesting observations on this question [see this *Bulletin*, Vol. 26, p. 658] showing that any species of *Ornithodoros* is capable of transmitting all strains of relapsing fever normally transmitted by ticks belonging to this genus. In order to succeed it is necessary to feed the ticks on the infected animal during the nymphal stage. The infection is usually transmitted hereditarily in the tick through several generations, but when the species of tick is not the carrier of the spirochaete in nature, the infection seems to die out sooner than when the tick is the natural carrier.

E. H.

MOSKWIN (I. A.). Ueber die Rolle der Zecke (Ixodoidea) *Ornithodoros papillipes* Bir. (Turkestan) in der Uebertragung des Rückfallfiebers. [**The Rôle of *O. papillipes* Bir. (Turkestan) in the Transmission of Relapsing Fever.**]—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 73–89. With 8 text figs. [39 refs.]

A description of transmission experiments with *Ornithodoros papillipes* and a strain of Russian relapsing fever. The ticks were obtained from Turkestan and were proved to be uninfected on arrival. These ticks were fed through a membrane on defibrinated blood containing numerous spirochaetes. A modification of HINDLE and MERRIMAN's method was adopted [see this *Bulletin*, Vol. 23, p. 293] using a piece of a bat's wing as the membrane. Infected ticks when fed on guineapigs and rabbits produced infection with spirochaetosis. The injection of coxal fluid from these ticks into susceptible animals never produced infection, and the author is of the opinion that the salivary secretion is responsible for the introduction of the infection. The inoculation respectively of salivary glands, alimentary canal, Malpighian tubules and ovaries of infected ticks in all cases produced infection in guineapigs. The inoculation of the salivary glands of infected ticks produced infection in guineapigs after a shorter incubation period than when any other infected organ was inoculated, which supports the view that this is the most favourable site for the infective stage of the spirochaete in the tick. The author traced all stages in the tick from the spirochaete in the alimentary canal to granular and cyst-like forms in the Malpighian tubules, salivary glands and ovaries, but efforts to trace any development in pure cultures gave negative results. It is noted, however, that 12 days after ticks had fed on blood containing spirochaetes, no trace of these organisms could be found either in the gut or any of the other organs. Yet the bites of these ticks produced infection respectively 30, 150 and 170 days after the original infected meal. The ease with which infection could be transmitted by this species of tick supports the view that in nature, it is responsible for the spread of relapsing fever in Bokhara.

E. H.

KNOWLES (R.), GUPTA (B. M. Das) & BASU (B. C.). **Preliminary Observations on the Morphology and Life-History of *Spirochaeta anserina*.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 573-581. [12 refs.]

The authors have studied the life-history of *Spirochaeta anserina*, the common fowl spirochaete, in both the vertebrate and invertebrate hosts. Although *Argas persicus* is very common in Calcutta, neither infected fowls nor ticks were ever obtained there and the strain used was obtained from the Institute for Veterinary Research at Muktesar. 126 fowls were infected and when 0.5 cc. of infected blood was injected into the wing vein the birds almost invariably showed spirochaetes in the circulation within 24 hours. The birds then had a single attack of fever generally of 2-7 days, and in fatal cases death occurred in 1-27 days after inoculation, the mean being 6.45 days. Spirochaetes were present in the circulation for an average of 2.5 days and before disappearing gathered in tangles and broke up into granules, which, however, are considered to be entirely the result of degeneration. Some birds showed an after-phase, resembling that described by Dr. Andrew BALFOUR in Sudanese fowls. The disease is considered to bear no direct relation to spirochaetosis, but to be the result of overcrowding or keeping the birds under unhealthy conditions. The bodies found in the red cells are explained as the result of karyorrhexis of the nuclei, poisoned by toxins. No intracellular stage of the spirochaete was found in any of the internal organs of infected fowls.

With regard to the life cycle in the invertebrate host, *Argas persicus*, 51 out of 58 became infected when fed on birds at the height of the disease. These were dissected at various intervals and emulsions of the organs examined under the dark ground. Spirochaetes were observed in the internal organs of these 51 ticks as follows: Intestine or diverticula in 40; salivary glands in 25; coxal gland in 7 out of 35 females; Malpighian tubules in 4; coelomic fluid in 21; testis in 2 out of 16 males; white gland in 6 out of 16 males; ovary in 3 and uterus in 2 out of 35 females; brain in 12.

The authors believe the life-cycle to be as follows: In the tick 85 to 90 per cent. of the ingested spirochaetes die off and the remaining 10 to 15 per cent. assume two types. The majority are normal and actively motile spirochaetes, dividing by binary fission but in addition long jointed forms are present which break up into 3, 4 or 5 short forms. By incessant division of the motile forms the gut gradually contains numerous very fine short spirochaetes—about one-third the length of the blood form and extremely thin. These "*tenue*" forms invade the coelomic fluid from the 6th day onwards and infect all the viscera. The residual forms in the gut gradually disappear and as a rule no motile forms are present after the 18th day. The coelomic forms show a very fine terminal flagellum at each extremity about $\frac{1}{4}$ to $\frac{1}{6}$ the length of the spirochaete. Although they invade all organs they accumulate especially in the salivary glands where they develop into normal spirochaetes resembling the blood forms. Infection is normally transmitted by the introduction of saliva containing spirochaetes when an infected tick feeds, but occasionally the coxal secretion is also infective.

The authors found no evidence of a granule phase and ticks kept at 60° to 85° F. showed essentially the same cycle as those kept at higher temperatures.

JAKIMOW (W. P.). Zur Frage ueber die Rezidivrasen der *Spir. obermeieri* bei experimenteller Rekurrens. Vorläufige Mitteilung. [The Problem of the Relapse Strains of *S. recurrentis* in Experimental Relapsing Fever. Preliminary Note.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 64. No. 1/2. pp. 9–15. [7 refs.] [Microbiol. Inst., Health Commissariat, Kasan.]

Employing the adhesion test and protective inoculation experiments, the author has studied the relation between the original and relapse strain in the case of animals infected with a Berlin strain of *S. recurrentis*. The relapse strain was only biologically distinct from the original strain in about 50 per cent. of the cases tested. The relapse strain of spirochaetes when passed through successive animals gradually lost its characteristics and reverted to the type of the original strain, which seems to be more stable. This modification occurred in rats inoculated with the relapse strain.

In three cases a completely new type of spirochaete appeared which was biologically distinct from both the original and relapse strains.

The passive immunization of mice with antibodies against the original strain and the subsequent inoculation of the same strain showed that a complete immunity had developed in 40 per cent. of the animals; in 37.5 per cent. an incomplete protection and only in 16 per cent. was the treatment entirely without effect.

E. H.

ROTHERMUNDT (Max). Ueber die Beziehungen zwischen Virulenz und Persistenz der Rekurrensspirochäten im Gehirn weisser Mäuse. [The Relation between the Virulence and Persistence of Relapsing Fever Spirochaetes in the Brains of White Mice.]—*Arb. a. d. Staatsinst. f. Exp. Ther. u. d. Georg Speyer-Hause zu Frankfurt a.M.* 1928. No. 21. pp. 329–343. [8 refs.] [Georg Speyer House, Frankfurt a.M.]

The author states that in Germany the only strain of relapsing fever known to produce residual brain infections in mice is an African strain of *S. duttoni* kept at the Hamburg Tropical Institute. Experiments have been made with a Russian strain and it was found that animals infected by ordinary subcutaneous or intraperitoneal inoculations never showed persistent brain infections. When, however, mice were infected by percutaneous inoculation, or by feeding on infected material, the mortality and virulence was definitely lowered and these animals showed a more feeble development of antibodies. In these mice persistent brain infections were observed which the author correlates with the lowering in virulence [see this *Bulletin*, Vol. 25, pp. 590 and 592].

E. H.

IGERSHEIMER & BODENHEIMER (E.). Experimentelle Rekurrensstudien am Auge. [Experimental Relapsing Fever Studies on the Eye.]—*Arb. a. d. Staatsinst. f. Exp. Ther. u. d. Georg Speyer-Hause zu Frankfurt a.M.* 1928. No. 21. pp. 238–251. With 2 text figs. & 4 coloured figs. on 2 plates. [7 refs.] [Georg Speyer House, Frankfurt a.M.]

The authors have studied the effects of three strains of relapsing fever spirochaetes on the eyes of rabbits. In addition the persistence

of the infection in animals inoculated in different parts of the eye is described, from which it seems that the spirochaetes may persist in the cornea after they have disappeared from other parts of the body. The original article should be consulted by those interested in the subject.

E. H.

GRAY (J. D. Allan). **A Study of Experimental Infection by *Treponema duttoni*: with a Review of the Literature.**—*Ann. Trop. Med. & Parasit.* 1929. June 27. Vol. 23. No. 2. pp. 241–267. With 2 charts. [4 pages of refs.] [Bact. Dept., Univ., Edinburgh.]

The author has made various experiments on laboratory animals with a strain of *Spirochaeta duttoni* and compares his results with those of other workers. It is of interest that antibodies could not be demonstrated by either *in vitro* or *in vivo* experiments and the spirochaetes of successive relapses in any one animal could not be distinguished by their immunity reactions, and efforts to demonstrate the Pfeiffer reaction failed.

In common with many strains of *S. duttoni* in Europe, the author found that his strain was markedly resistant to organic arsenicals, as shown by the results of experiments with "sulphostab" (dioxidydiaminoarsenobenzol-sodium formaldehyde-bisulphite) and sulfarsenol. A bismuth compound, "bismostab," consisting of a suspension of finely divided bismuth in 5 per cent. glucose solution, also had little or no effect on the disease.

E. H.

CUBONI (Ettore). Infezione sperimentale con "*Spirochaeta Duttoni*" nel coniglio e nella cavia. [**Experimental Infections of *Spirochaeta duttoni* in Rabbits and Guinea-pigs.**]—*Bol. Istituto Sieroterap. Milanese.* 1929. July. Vol. 8. No. 7. pp. 413–434. [29 refs.] German summary pp. 434–435.

The author tested the effect of a gold salt (Sulfo-crisolo I.S.M.) on mice infected with an arsenic resistant strain of *S. duttoni*. The gold salt was found to cure these infections, but had no effect on mice infected with *Trypanosoma evansi* (2 strains), *T. brucei* (2 strains), and *T. equinum*. Experiments were then made on the susceptibility of rabbits to this strain of *S. duttoni* and it was found that the injection of a small dose sensibilized the animal, and the subsequent injection of other small doses produced a more severe infection than a single intraperitoneal injection of a large dose of infected blood. New-born rabbits were easily infected by both subcutaneous and intraperitoneal injections, and in these animals numerous spirochaetes were present in the blood. The blood serum of rabbits after recovery from the infection immobilized the spirochaetes, but this action was destroyed by heating to 56° C. for 30 minutes, and was not restored by the addition of guinea-pig complement. Brain infections were very rarely observed in rabbits 20 days, or later, after inoculation.

Guinea-pigs were infected by the intraperitoneal inoculation of large doses of spirochaetes, and although the organisms were not always detected by microscopical examination, the inoculation of blood into mice proved that they were present in the circulation. New-born guinea-pigs invariably became infected after either intraperitoneal or subcutaneous inoculation, and also showed relapses 4–5 days after the

original attack. The inoculation into mice of brains from three recovered guineapigs was negative, but in the case of four newly born guineapigs infected with spirochaetosis residual brain infections were found 44 days after the disappearance of spirochaetes from the circulation.

E. H.

MORODER (Juan). Ueber die Züchtung der Rekurrens-Spirochäten. [**The Cultivation of Relapsing Fever Spirochaetes.**]—*Arch. f. Schiffsw. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 603–610. [4 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The author has studied cultures of four strains of relapsing fever in a simple medium consisting of inactivated rabbit or horse serum, diluted with normal saline solution (1 : 2–5) and covered with a layer of paraffin. His observations help to explain many of the inconstant results of previous workers, for often cultures which were completely negative to microscopic examination for spirochaetes produced infection when inoculated into mice, or showed spirochaetes in subcultures. Very often these seemingly negative cultures showed small granules, resembling micrococci, but cultures on agar slopes showed that these were not contaminating organisms. Out of 17 mice inoculated with cultures showing no trace of spirochaetes, 15 became infected with spirochaetosis after an incubation of 2 to 4 days.

E. H.

MORETTI (P.). Sulla resistenza della spirocheta della febbre ricorrente al neosalvarsan nelle infezioni sperimentali. (Nota II). [**The Resistance of Relapsing Fever Spirochaetes to Neosalvarsan.**]—*Giorn. di Batteriol. e Immunol.* 1929. Jan. Vol. 4. No. 1. pp. 3–8. [18 refs.] [Inst. of Path. & Clin. Med., Univ., Messina.]

The author set out to study the fact that arsenical compounds, efficacious in the earlier stages of relapsing fever, may be ineffectual if a prolonged period such as 100 days is allowed to elapse between experimental infection with the spirochaete and the giving of the drug. He found that in some cases (mice were used) even after so long as 219 days neosalvarsan succeeded in ridding the brain of spirochaetes, but that the operation of splenectomy or blocking of the reticulo-endothelial system greatly reduced, if it did not entirely abrogate, the effect of the drug; hence the integrity of this system is believed to be a *conditio sine qua non* for successful chemotherapy of this disease.

H. Harold Scott.

HOWARD (A.). Action préventive et curative du thiopropanol sulfonate double d'or et de sodium (allochrysine) dans la spirillose des poules (*Sp. gallinarum*) et la fièvre récurrente de la souris (*Sp. duttoni*). [**The Preventive and Curative Action of Allochrysine in Fowl Spirochaetosis (*S. gallinarum*) and Relapsing Fever in Mice (*S. duttoni*).**]—*C.R. Soc. Biol.* 1929. July 17. Vol. 101. No. 24. pp. 927–928. [3 refs.]

Allochrysine is a thio-propanol sulphonate of gold and sodium ($C_6H_{13}O_2S_4AuNa_2$) and is less toxic than other gold salts. It has been

used successfully in the treatment of experimental syphilis, and the results in the present article show clearly that it has both a curative and also protective action in fowls infected with *S. gallinarum* and mice infected with *S. duttoni*. It has no action on *Trypanosoma brucei* infection in mice.

E. H.

NOHIRA (A.). **An Experimental Study of Hereditary Immunity from Relapsing-Fever. (The First Report.) The Resistance against Infection (Hard or Difficult Infectiousness) of the Offspring of Infected Mice.**—*Japan Med. World.* 1929. Mar. 15. Vol. 9. No. 3. pp. 83–84. [1 ref.] [Dermat. Clinic, Imperial Univ., Kyoto.]

The offspring of mice infected with a Manchurian strain of relapsing fever were tested concerning their immunity to infection. When a normal mother was paired with an immune male, the resulting offspring showed no immunity; but when the mother was immune, the offspring also showed a certain degree of resistance to infection. The resistance of the young rarely lasted for more than 60 days after birth. The results indicate that the immunity is the result of immune bodies passing through the placenta from the mother, and not to antenatal infection of the young themselves.

E. H.

NOHIRA (A.). **An Experimental Study of Hereditary Immunity from Relapsing-Fever. (The Second Report.) The Resistance against Infection of Brothers of an Infected Mother Animal.**—*Japan Med. World.* 1929. Apr. 15. Vol. 9. No. 4. pp. 119–121. [Dermat. Clinic, Imperial Univ., Kyoto.]

The author has made detailed experiments with the offspring of infected mice, and found that when born within 14 to 54 days of the mother's infection, the young rarely showed any inherited immunity against infection with relapsing fever. When a longer period, 90 to 117 days, elapsed between infection and birth, the offspring showed a much higher degree of resistance. The examination of successive litters of the same animal showed that in some cases only one litter had a high degree of resistance, litters both before and after being susceptible to infection. In other cases a succession of litters were resistant, the immunity persisting for a considerable period. This resistance is evidently the result of immune bodies passing from the blood of the mother into the foetus, for when the mother was found to be susceptible to reinfection, the offspring never showed any inherited immunity. The examination of different individuals of the same litter showed that the inherited immunity gradually diminishes with age. Within 30 days after birth the young often had a high degree of immunity, but after 60 days very few individuals were found to show any resistance.

E. H.

BELEZKI (W. K.) & UMANSKAJA (R. M.). Ueber die Natur der Immunität bei Rückfallfieber. VII. Morphologische Untersuchung der Schutzfunktionen bei Rückfallfieber des Menschen. [**Nature of Immunity in Relapsing Fever. VII. A Morphological Study of the Protective Mechanism in Human Cases of Relapsing Fever.**]—*Virchows Arch. f. Path. Anat.* 1929. May 18. Vol. 272. No. 2. pp. 305–312. With 5 text figs. [5 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

The author has studied the histology, with special reference to the appearance of the spirochaetes, in three human patients who died of relapsing fever during the infection. As a result of his observations, the author considers that antibodies, spirochaetolysins, play the most important part in protection against the spirochaete, as evidenced by the gradual dissolution of the organisms in the organs and blood circulation. Phagocytosis, although it takes place, is comparatively feeble and plays a very subordinate part in the disappearance of the spirochaetes. The phagocytic action depends on the cells of the reticulo-endothelial system, the round histiocytes, and the monocytes of the blood. In the brain the glia and Hortega cells act as phagocytes.

E. H.

ARISTOWSKY (W. M.) & WAINSTEIN (A. B.). Rekurrens-Schutzimpfungsversuche [am Menschen. 2. Mitteilung. [**Experiments on Protective Inoculation against Relapsing Fever in Man.**]]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 63. No. 3/4. pp. 240–249. [Microb. Inst., Tatar Health Commissariat, Kasan.]

A continuation of experiments previously recorded [see this *Bulletin*, Vol. 26, p. 656]. The authors inoculated patients with a vaccine composed of a mixture of cultures of both the original and relapse strains of *S. recurrentis*, which after being incubated at 37° C. for 3 days were subsequently kept at room temperature for 14–16 days until they had lost their virulence. Each patient received three injections of this mixture (1.0, 1.5 and 2.0 cc.) at 3-day intervals. A week after the last injection the blood was found to contain spirochaetolysins against both original and relapse strains, and two of the patients were inoculated with living spirochaetes of both strains respectively without becoming infected. These results show that it is possible to produce immunity by the inoculation of dead spirochaetes, and support the view that in relapsing fever immunity does not depend on a persistent infection, as suggested by certain authors, but is the result of the development of spirochaetolysins, etc., in the blood, causing a "sterile" immunity.

E. H.

WEISS (Emil). **A Simple Method for Staining Spirochetes.**—*Jl. Lab. & Clin. Med.* 1929. Sept. Vol. 14. No. 12. pp. 1191–1193. [3 refs.]

Spirochaetes are stated to have a greater affinity for acid dyes, whilst bacteria preferably take basic dyes. The author has found that various mordant methods such as those used for flagella give good results with

spirochaetes, but it is difficult to avoid general precipitation on the film, and most mordants do not keep. The following method has been found to give the best results:—

The material containing spirochaetes is placed on a slide in a drop of 5 per cent. acetic acid. The slide is inverted over a hollow ground slide and placed in the incubator for 15 minutes. The drop is then spread on the slide and allowed to dry. The slide is then covered with the mordant and gently heated until it steams. The most useful mordant is prepared by mixing one part of a solution of 100 gm. tannic acid in 100 cc. of 95 per cent. alcohol, with two parts of a solution consisting of undiluted formalin containing 7.5 per cent. acetic acid. After 2 to 5 minutes the excess mordant is washed off with warm water and the film then stained with combinations of acid and basic dyes, of which the following are recommended: gentian violet and acid green; safranin or fuchsin with acid green; brilliant green with acid violet or acid fuchsin. The slides are first stained for 2–5 minutes in a saturated aqueous or alcoholic solution of the basic dye, washed off with warm or cold water and then covered for 8–10 minutes with the acid dye dissolved in 30 per cent. alcohol. The slides are then washed in water and allowed to dry without heating.

E. H.

GOLDIE (Horatio). Beobachtungen ueber die Spirochätenenteritis. [Notes on Spirochaetal Enteritis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. June. Vol. 33. No. 6. pp. 313–322. [58 refs.]

Three cases attributed to this disease were studied by the author in Palestine, who gives details of the symptoms and treatment. All three had periodical attacks of diarrhoea, when the stools were slimy or purulent and contained blood. Microscopical examination showed large numbers of spirochaetes or epithelial cells and the general appearance suggested the existence of a chronic ulcerative condition. Protozoa and bacillary infections were excluded, and the author considers that these were cases of the ordinary saprophytic spirochaetes producing secondary infections in the intestine. They belonged to the type of case described by LUGER. All three were cured by treatment with stovarsol.

E. H.

GARDNER (G.). Nouvelle contribution à la biologie des spirochétidés. [A New Contribution to the Biology of Spirochaetes.]—*Univ. Montréal Lab. de Biol. Contrib.* 6. 1929. 43 pp. With 11 figs. [39 refs.]

A record of observations on spirochaetes in Canada, especially of forms obtained from cultures of hay. The author makes the curious statement that tuberculinized cattle never show spirochaetes in the mouth or the faeces, and suggests the possibility of some association between these organisms and the tubercle bacillus.

E. H.

DE MELLO (I. Froilano). Sur le commensalisme de la faune spirochétique dans les arcades dentaires et dans l'intestin de l'homme et des animaux. [On the Commensalism of the Spirochaetal Fauna in the Gums and in the Intestine of Man and Animals.]—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 465–477. [10 refs.]

This paper is essentially the same as that reviewed in this *Bulletin*, Vol. 26, p. 123, but the author gives full details of all measurements, etc.

The gums in both man and animals show a very similar spirochaetal fauna, and several domestic animals contain in the intestine a form indistinguishable from *S. eurygyrata*. Morphological methods, especially the various methods of measurement devised by the author, are considered to be of help in distinguishing the species and to show their homologies.

E. H.

BALBI (E.) & CHINAGLIA (A.). Sulla presenza di spirochete nel sangue di soggetti malati e sani. Nota preventiva. [**Spirochaetes in the Blood in Health and Disease.**—*Riforma Med.* 1929. Sept. 28. Vol. 45. No. 39. pp. 1311–1312. With 1 text fig. [Dermosyph. Clinic, & Inst. of Path. Anat., Univ., Padua.]

The authors took blood by venepuncture with a syringe sterilized at 180° C. for 20 minutes, and placed it in broth sterilized on three successive days for 30 minutes at 115° C. Examination by dark-ground illumination from the third to the eighth days showed spirochaetes in considerable numbers, after which time they rapidly decreased. The broth alone showed none. They could not be detected on staining. They were found in all but two of 49 patients suffering from various diseases—syphilis, tuberculosis, scabies, colitis, gonorrhoea and others—and in 14 out of 16 healthy subjects. The dimensions of the spirochaete, which is denominated "*Haematospira hominis*," were 6–25 microns in length and 0.3–0.4 wide, with refractile ends.

H. Harold Scott.

[It is obvious that the authors merely observed degenerated blood cells.]

E. H.

GHETTI (G.). Su di un caso di pseudotubercolosi da *Spirocheta* bronchiale del Castellani.—*Arch. Ital. Sci. Med. Colon.* 1929. Apr. 1. Vol. 10. No. 4. pp. 177–181. English summary p. 181. [Inst. Colonial Path., Univ., Bologna.]

MANIERI (Alberto) & GORI (Pio). Observations sur l'infection récurrente expérimentale du lapin. (*Spirochaeta Duttoni*).—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1929. Jan. Vol. 1. No. 1. pp. 19–21. [Inst. of General Path., Univ., Florence.] [v. this *Bulletin*, Vol. 26, p. 663.]

DE MELLO (Froilano) & FIALHO. Sur les spirochètes commensaux des arcades dentaires et de l'intestin de l'homme et des animaux.—*Giorn. di. Batter. e Immunol.* 1928. Oct. Vol. 3. No. 10. 23 pp. With 32 figs.

LEPTOSPIROSIS.

SCHÜFFNER (W. A. P.). De ziekte van Weil in Cliniek en Laboratorium. [**Clinical and Laboratory Aspects of Weil's Disease.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. Oct. 5. 73rd Year. 2nd Half. No. 40. pp. 4707-4726. [Bijblad pp. 247-266]. With 1 plate facing p. 4713, 1 map & 8 charts.

Since the Institute of Tropical Hygiene at Amsterdam began to study the question of Weil's disease in 1924, 46 cases, of which 10 were fatal, have been investigated. Cases occurred in every month of the year, but the majority were found in August (5), September (11), and October (5). It was a remarkable fact that 3 cases occurred in December and another 3 in January, when contact with open water, the chief aetiological factor, is least likely to take place. In not less than 20 cases, indeed, there was a history of a fall, accidental or suicidal, into water, and in most of these cases the persons had been immersed for some time and some had been taken out in an unconscious condition.

It is true that the disease is only an exceptional sequel of such an accident, as since April 1928, 127 persons in Amsterdam had fallen into the water without subsequently developing Weil's disease.

In 7 cases there was a history of swimming, and 5 of the patients had been in constant contact with water (seamen and slaughtermen), while in 13 there was no indication as to how the disease was contracted.

Of the 46 cases 36 had definite jaundice, 9 had no jaundice and in 1 the presence of jaundice was doubtful. The diagnosis was established in 11 by cultivation of *Leptospira icterohaemorrhagiae*, and in 35 by serological examination only. As regards their topographical distribution, Amsterdam and Rotterdam headed the list with 15 and 11 cases respectively, and, generally speaking, the disease was more prevalent in the water district than in the meadow land.

Schüffner's conclusions are as follows:—

(1) In cases of acute fever of which the cause is not obvious, one should think of leptospirosis as well as influenza. Only a certain proportion of the cases show jaundice.

(2) The possibility of the diagnosis is all the greater when there is a history of a fall into the water or of much bathing.

(3) If the onset is severe, serum should be given without delay, as the sooner it is given, the more powerful its effect. When once jaundice has appeared the serum is useless.

J. D. Rolleston.

HOESCH (K.). Zur Klinik der Weilschen Krankheit. [**A Clinical Study of Weil's Disease.**]—*Ztschr. f. Klin. Med.* 1929. May 31. Vol. 110. Nos. 4 & 5. pp. 557-577. With 2 text figs. [14 refs.]

Observations on previous epidemics and on two very typical cases of Weil's disease have led the author to the opinion that many cases of this infection have the appearance of ordinary catarrhal jaundice. In both cases there is often hepatic coma with inflammation of the bile-ducts, resulting in the development of uraemia, and the author gives the results of blood analyses supporting this view.

The kidney is also affected in Weil's disease, as shown by the diminution of the phosphorus fraction of the blood and the renal insufficiency. As a result of the clinical study of the disease it is evident that it should be regarded as a hepato-nephritis with suppurating cholangitis.

E. Hindle.

EPSTEIN (H.) & TARASSOW (S.). Zur Ätiologie des sogenannten Schlamm- oder Wasserfiebers. [**On the Causation of Marsh or Water Fever.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Apr. Vol. 33. No. 4. pp. 222–223. [Metchnikoff Inst. for Infectious Diseases, Moscow.]

It had been suggested that this fever might be allied to Weil's disease; accordingly, when a fresh outbreak occurred near Moscow, Dr. Tarassow was sent to investigate.

The patients had high fever, with severe pain in the back and loins and slight yellowness of the conjunctiva.

On the second and third days of the illness 10–20 cc. of blood were drawn off from a vein from these patients. This blood was injected into guineapigs intraperitoneally, and cultures were also made on media suitable for the growth of leptospira. Fifty cultures in all were made, but only 39 safely reached the Metchnikoff Institute in Moscow. From the first case, in three of the cultures numerous leptospira appeared after 12, 20 and 65 days respectively. From the second case one culture was also successful. In the third patient all the cultures were sterile.

The leptospira isolated were morphologically identical with *L. icterohaemorrhagiae*. It is therefore likely that at least some of the cases diagnosed as marsh fever are really Weil's disease.

D. Harvey.

STRASBURGER (J.) & THILL (O.). Klinik der Weilschen Krankheit. Mit Mitteilung von zwei neuerding beobachteten Fällen. [**The Symptoms of Weil's Disease. With Notes on Two Recent Cases.**—*Klin. Woch.* 1929. July 23. Vol. 8. No. 30. pp. 1391–1395. With 2 graphs in text. [19 refs.] [Med. Polyclinic, Univ., Frankfurt a.M.]

A very detailed account of the clinical symptoms and course of this disease in two patients at Frankfurt, who both seem to have acquired the infection as a result of bathing in the river Main during the warm summer of 1928. Methods of distinguishing Weil's disease from other infections are also discussed.

E. H.

TROISIER (Jean), LEON-KINDBERG & MONNEROT-DUMAINE (M.). Recrudescence estivale de la spirochétose ictéro-hémorragique provoquée par les bains de rivière. [**The Summer Recrudescence of Spirochaetal Jaundice produced by River Bathing.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1929. Oct. 21. Year 45. 3rd Ser. No. 28. pp. 1161–1163.

The record of a case of this disease in a patient who habitually bathed in the Seine at Asnières and became infected in September. In the discussion

following the paper, six other cases were mentioned, in all of which infection seemed to have been acquired by bathing in water containing the spirochaetes.

E. H.

BRULÉ (M.) & STÉHELIN. Spirochétose ictéro-hémorragique sans azotémie pendant la rémission thermique. [*Spirochaetal Jaundice without Azotemia during the Febrile Relapse.*]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1929. July 22. Year 45. 3rd Ser. No. 25. pp. 1043–1047. [6 refs.]

Details of a case of this disease in Paris which is of interest, as the patient during the relapse showed no trace of any increase in the urea content of the blood, which, as a general rule, rises considerably during this period.

E. H.

SANARELLI (G.) & PERGHER (G.). Patogenesi delle spirochetosi itterogene. [*Pathogenesis of Spirochaetal Icterus.*]—*Ann. d'Igiene*. 1929. June. Vol. 39. No. 6. pp. 401–433. With 8 coloured figs. on 2 double plates. [27 refs.] [Hyg. Inst., Univ., Rome.]

This article follows up one published three months previously (this *Bulletin*, Vol. 26, p. 669). The authors describe the pathological effects of *L. icteroides*, *L. icterohaemorrhagiae*, and *Sp. autumnalis* alone and complicated by secondary invaders to which they ascribe most, if not all, of the lesions produced. They seem to regard the first as a valid organism distinct from the second. The following is a summary of their conclusions:—

1. *L. icteroides* can live and multiply for a long time in the body of a guineapig without producing marked anatomical changes. Such, when present, are due to ancillary organisms, coliform bacilli for example, the leptospira then being no longer recoverable.

2. Experiments *in vitro* show that spirochaetes are endowed with very faint powers of resistance to such antagonistic organisms.

3. The secondary invaders (microbi di sortita) isolated from animals infected with spirochaetes have not such virulence as would account for the anatomical conditions found at autopsy.

4. Animals when attacked by these invading organisms behave in exactly the same way whether the primary infection is by *L. icteroides*, *L. icterohaemorrhagiae*, or *Sp. autumnalis*.

5. Invasion by the organisms occurs towards the end of the febrile attacks due to the spirochaetosis, or soon after. This critical apyrexial period is denominated "crisis nefasta" in contradistinction with the "crisis benefica" of acute infective diseases.

6. The invading organisms are usually the same for the same animal: For guineapigs, streptococci or, rarely, one of the paratyphoids; for rabbits, one of the Coli group; for young dogs, streptococci, colon bacilli, staphylococci, and paratyphoids; for man, one or other of the last named.

7. This secondary invasion is facilitated, not by a reduced bactericidal power of the blood-plasma, but by overthrow of the protective functions of the liver.

8. The degree of change observed is not ascribable to the tissue-reaction to the spirochaetes, this being always the same, but to the action of the invading organism alone, or in combination with others. The spirochaetes

alone are incapable of causing the death of the animals. Death, when it results, is due to inflammatory or suppurative processes in lungs, liver, spleen, etc., by cachexia or leading to a generalized septicaemia.

H. Harold Scott.

SANARELLI (G.) & PERGHER (G.). Pathogénie des spirochètoses ictérogènes (troisième mémoire). Les "crises néfastes" dans les spirochètoses. [**Pathogeny of Icterogenic Spirochaetosis (3rd Memoir). The "crises néfastes" in Spirochaetoses.**]—*Ann. Inst. Pasteur*. 1929. July. Vol. 43. No. 7. pp. 908-954. With 2 coloured figs. on 1 plate. [91 refs.]

This paper is a continuation of the arguments advanced in the two preceding memoirs and also in the article reviewed above. The authors' views can hardly be taken seriously. In the case of yellow fever they put forward the hypothesis that *Leptospira icteroides* is the aetiological agent of the disease and Sanarelli's "*Bacillus icteroides*" is a secondary infection producing the symptoms of the disease. Many of the statements in the paper are surprisingly inaccurate, such as one to the effect that if NOGUCHI's death was the result of laboratory infection with yellow fever, it would be the first authentic case of its kind!

E. H.

UHLENHUTH (P.) & SEIFFERT (W.). Untersuchungen ueber die Ausheilung der Weilschen Krankheit bei Meerschweinchen unter der Behandlung mit Bismuto-Yatren A. [**Investigations on the Treatment of Weil's Disease in Guineapigs by the Use of Bismuth Yatren A.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Oct. 31. Vol. 114. No. 4/6. pp. 241-251. [4 refs.] [Hyg. Inst., Univ., Freiburg i.B.]

This paper is a continuation, with experimental details, of those reviewed in this *Bulletin*, Vol. 25, p. 609, and Vol. 26, p. 672. The results of treating infected guineapigs with Bismuth Yatren A show that this compound does not act on the spirochaete, but on the protective mechanism of the host. Guineapigs that had been cured by injections of this compound were killed 3 to 6 weeks later and their organs inoculated into normal animals, none of which became infected, showing that the spirochaetes had disappeared completely. These treated guineapigs were found to be resistant against reinfection 4 to 12 weeks later, and their blood contained passive immune bodies. The protection against reinfection does not depend on the persistence of the compound in the internal organs, for the analysis of the liver showed that the bismuth is eliminated after 3 to 5 days.

The most significant evidence of the indirect action of the drug is the fact that if it is injected soon after the inoculation of the spirochaetes it has no effect on the course of the disease, which is a strong argument against the view that the organisms are directly killed by the drug. It would seem that the action of this compound is in some way bound up with the development of the natural resistance of the host.

E. H.

DAMON (S. R.) & HAMPIL (Bettylee). **Studies on Leptospirae. I. Some Observations on the Distribution and Cultivation of Leptospirae.**—*Jl. Bacteriology*. 1929. Nov. Vol. 18. No. 5. pp. 343-359. [8 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore, Md.]

An account of the examination of 131 samples of water from 47 different sources, collected at different times of the year, mainly in the neighbourhood of Baltimore or Washington. The authors cultured each water sample in Petri dishes containing a medium composed of 0.33 per cent. agar and 0.33 per cent. egg yolk in tap water; four cultures were made from each sample and two were kept at room temperature and two at 37° C. The interesting result has been brought to light that some of these water leptospira grow at 37° C., whilst others will only grow at room temperature. Seventy-three samples gave positive cultures, of which 40 were positive at 37° C. and 72 at room temperature, and the authors are of the opinion that these are distinct strains of leptospira. When the water samples were stored in the laboratory, it was found that the strain which grew at 37° C. died out much sooner than that which grew at room temperature. The samples were taken from a great variety of sources, and of 24 spring waters only one from a contaminated well was positive for leptospira, whilst of 69 surface waters, 57 were positive. Apart from this, there was no evidence of faecal contamination being necessary, and some of the negative spring waters had frogs and toads living in them. Chlorination was found to destroy the leptospira, but municipal waters negative when leaving the filtration plants were found to acquire the infection on passage through the city mains.

E. H.

KAGAYA (Kiichi). **The Experimental Study on the Difference between the *Leptospira icterohaemorrhagiae* and the Water Leptospira.**—*Japanese Jl. Experim. Med.* 1929. Aug. 10. Vol. 7. No. 3. pp. 393-407. [31 refs.]

A record of experiments on the nature of various strains of leptospira which are opposed to the view that all pathogenic forms are merely varieties of the common water leptospira. Cultures of the water leptospira in 10 per cent. rabbit serum never became virulent to guineapigs, even in the 72nd generation. When injected intraperitoneally into both guineapigs and mice, they never survived for more than 10 hours, as tested by cultures from various parts of the body. Numerous attempts were made to infect rats and guineapigs, using every conceivable method of inoculation, combined with malnutrition and the use of aggressins, but the results were uniformly negative. A guineapig was inoculated with 10 cc. of a culture of water leptospira, and after five hours the peritoneal exudate was removed and mixed with actively motile water forms. "The action of the leptospira was disturbed after 1 to 3 hours, but became again active after 20 hours." When the water leptospira and *L. icterohaemorrhagiae* were both exposed to the action of this exudate at 39 to 41° C., the water forms became inactive in 7-8 hours, and completely non-motile in 12 hours, whilst the pathogenic strain was unaffected.

The virulence of three pathogenic strains of leptospira was artificially lowered in cultures, so that they failed to produce infection when

inoculated into guineapigs, and thus superficially resembled the water forms. When, however, these pathogenic strains of low virulence were inoculated into guineapigs and rats, they persisted in the bodies of these animals for many days, up to as long as 75 days in the case of a rat. Water leptospira, on the contrary, rapidly disappeared after being inoculated. Details are then given of passage experiments, by means of which some of the strains of weakened virulence were again made fully virulent, but similar experiments with water forms gave negative results. Agglutination tests with the original pathogenic strain, the weakened strain, water leptospira, and the virulence recovered strain, and the four corresponding immune sera, showed that the three pathogenic forms were identical, but very distinct from the water form.

As a result of the author's observations, he is of opinion that *Leptospira icterohaemorrhagiae*, *L. hebdomadis* (including *L. Akiyami B*), *L. Akiyami A*, and the water leptospira are entirely distinct, and do not change from one form into another.

E. H.

KAGAYA (Kiichi). **A Critical Investigation on Type-Problem existing among Strains of *Leptospira Ictero-Haemorrhagiae* found in Japan.**—*Japanese Jl. Experim. Med.* 1929. Aug. 10. Vol. 7. No. 3. pp. 409–412. [13 refs.]

The author tested 11 strains of *L. icterohaemorrhagiae*, and although one of these was found to be difficult to agglutinate, they all agreed in their reaction to the lytic action of immune sera. None of these strains was affected by a water-leptospira immune serum.

E. H.

MITANAGA (Kazuyoshi). Ueber die Gruppenreaktion zwischen *Spirochaeta ikterohaemorrhagiae* und *Spirochaeta Akiyami-A*. [**The Group Reactions between *L. icterohaemorrhagiae* and *L. Akiyami-A*.**]—*Nagoya Jl. Med. Sci.* 1928. Oct. 25. Vol. 3. No. 2. pp. 85–95. [33 refs.] [Inst of Hyg. & Bact., Aichi Univ., Nagoya, Japan.]

The author prepared a very strong antiserum against *L. icterohaemorrhagiae* by inoculating a rabbit in the liver with 2.0 cc. of an emulsion of virulent spirochaetes from the liver of an infected guineapig. Subsequently, the rabbit at 4–5 days' intervals was inoculated intravenously 6–10 times with increasing doses of a culture of the organism. This serum agglutinated in dilutions of 10,000 to 20,000. Cultures of *Akiyami A* and *icterohaemorrhagiae* respectively were made in the presence of various dilutions of immune sera, and it was found that *Akiyami A* antiserum in dilutions of 1/320 prevented the growth of the homologous strain, whilst *icterohaemorrhagiae* grew in dilutions of 1/20 to 1/40. Similar results were obtained with *icterohaemorrhagiae* immune sera acting on the homologous and heterologous strains. Agglutination tests were made by putting 2 cc. of 0.4 to 0.5 per cent. agar dissolved in Ringer into small tubes, then sterilizing at 100° C. and adding 0.5 cc. of the dilution of the immune serum and mixing with the agar. Then a drop of the suspension of spirochaetes to be tested

was added to each tube, and the mixture incubated for three days at 37° C. The results showed that the homologous antiserum was 80 to 160 times more active than the heterologous one, but strong dilutions of both antisera agglutinated the heterologous strain. Similar results were obtained with Pfeiffer's reaction. Finally 24 guineapigs were injected with *Akiyami A* antiserum, and subsequently 12 with *Akiyami A* spirochaetes, and 12 with *icterohaemorrhagiae*. Of the latter, two died, whilst all the others lived. By using *icterohaemorrhagiae* antiserum, the opposite result was obtained, two out of 12 of the *Akiyami A* dying and the others all surviving. But the protective influence of the immune sera was evident even with the heterologous strains, for unprotected control animals inoculated with either strain all died of the infection.

It seems, therefore, that these two strains are closely related, but may be distinguished by the above-described tests.

E. H.

MIDDLETON (A. D.). *Leptospira icterohaemorrhagiae* in Oxford Rats.—*Jl. Hygiene*. 1929. July. Vol. 29. No. 2. pp. 219-226. With 3 text figs. [5 refs.] [Dept. of Zool. & Comparative Anatomy, Univ. Museum, Oxford.]

The author found that out of 235 rats collected in the Oxford district during June and July 1928, and January to March 1929, 41·7 per cent. contained *Leptospira icterohaemorrhagiae* in their kidneys. The percentage infection increased from nil in very young rats up to a maximum of 56 per cent. in fully grown individuals, with a slight diminution in the oldest rats. Sixteen house mice, two dormice and one rabbit were examined with negative results. Water leptospiræ were found in several localities, but attempts to infect guineapigs with them gave negative results, whilst the rat forms were pathogenic to guineapigs.

[The author's results confirm previous observations on this subject made in London by STEVENSON and FOULERTON [see this *Bulletin*, Vol. 15, p. 171; Vol. 19, p. 323] and by COLES in Bournemouth. No reference is made to these publications.]

E. H.

SSINJUSCHINA (M. N.). Zur Frage der Epidemiologie des infektiösen Ikterus in Moskau. [**The Problem of the Epidemiology of Infective Jaundice in Moscow.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Oct. 15. Vol. 114. No. 3. pp. 199-203. [14 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

The author examined 60 wild rats in Moscow and found 7 of them infected with *Leptospira icterohaemorrhagiae*. The thrombocytobarin reaction for this spirochaete gave uniformly negative results with the sera of all these 60 rats and consequently the author considers the method unreliable. The best method was found to be the cultivation of leptospira in a medium containing the serum of the rat under

examination, the presence of immune bodies in this serum preventing the growth of the organisms. In this way it was possible to discover infections which could not be recognized by any other methods.

E. H.

BESSEMANS (A.) & THIRY (U.). Sur une leptospirose spontanée de la souris. [**On a Spontaneous Leptospirosis in Mice.**—*C.R. Soc. Biol.* 1929. June 14. Vol. 101. No. 20. pp. 486-489. [2 refs.] [*Inst. of Hyg. & Bact., Univ., Ghent.*]

The authors previously recorded the production of fatal infections in mice by the inoculation of cultures of leptospira from Ghent tap water [see this *Bulletin*, Vol. 26, p. 671]. From the 22nd subculture this organism lost its virulence, and when inoculated into mice produced no apparent symptoms, but these inoculated animals became carriers of the virus and leptospira could be found in their urine. The authors then examined mice from different localities in Ghent and found that 17 young individuals were all uninfected, of 21 adults 6 were infected, and of 21 old mice all but 2 were infected. These results confirm the view that the Ghent water contains this pathogenic strain, for mice from Louvain and Germany were all negative. Infected mice rarely show leptospira in the blood, but the urine is always positive, although no other signs of infection can be detected, and even the kidney is normal in appearance. The subcutaneous inoculation of infected urine or kidneys containing leptospira gave negative results. When normal mice were kept in the same cage as infected ones, they became infected after about two months. When urine containing leptospira was introduced into the mouths of normal mice infection was readily produced, sometimes after an incubation of only 7 days, so the normal method of transmission seems to be *per os*. The infection is not hereditary. Serologically this strain of mouse leptospira was found to be distinct from both *L. icterohaemorrhagiae* and an ordinary water strain. This spontaneous infection with leptospira in Ghent mice seems to be the result of mice ingesting water containing the organism, but the origin of the pathogenic strain previously recorded is not quite clear.

E. H.

SAENZ (A.). Infection transplacentaire du cobaye par le spirochète ictero-hémorragique. [**Infection through the Placenta of the Guinea-pig with *L. icterohaemorrhagiae*.**—*C.R. Acad. Sci.* 1929. May 27. Vol. 188. No. 22. pp. 1455-1456. [1 ref.]

The author inoculated a pregnant guinea-pig with this organism and 5 days later removed the placenta and a 6 cm. foetus. A guinea-pig inoculated with an emulsion of this foetus died of spirochaetal jaundice 7 days later, whilst a second animal inoculated with the placenta died of the same infection after 13 days. A second pregnant guinea-pig was infected 6 days before the birth of two young ones, both of which were found to contain the spirochaete, but two young ones born dead 16 hours after the mother had been inoculated were found to be free from the infection.

E. H.

DE LAVERGNE & FLORENTIN (P.). Lésions de spirochétose ictéro-hémorragique chez le cobaye. Ictère et purpura. [**The Lesions of Spirochaetal Jaundice in the Guinea-pig.**—*Bull. Soc. Française Dermat. et Syph.* 1929. Jan. No. 1. p. 54 (R.N. p. 18).

The demonstration of a case of this disease in a guinea-pig.

E. H.

DONOMAE (Imago). **Clinical and Experimental Studies of Lipoid Metabolism in *Leptospira-icterohemolytica*.**—*Nisshin Igaku (Jl. Progressive Med.)*. 1929. May. Vol. 18 No. 9. [Summarized in *Japan Med. World*. 1929. July 15. Vol. 9. No. 7. pp. 231-232.]

The author analysed the blood and organs of guinea-pigs infected with spirochaetal jaundice, records being kept of the body weights and temperatures during the course of the infection. The results indicate that there was no marked difference in the water content of the blood during the febrile period, but with the access of jaundice it increased. The total fatty acids and lecithin were increased during both periods and the cholesterol markedly decreased. The water content in the liver, kidney, spleen and supra-renal increased during both the febrile and jaundice periods, but there was no change in the heart, skeletal muscles and testes. The quantity and ratio of lipoids remained constant.

The total fatty acids and lecithin in the supra-renal were the same, but cholesterol increased slightly during the febrile period. During the jaundice period the first two were slightly, and the last markedly, decreased. The ratio of total fatty acids and lecithin was not changed, but the lecithin and cholesterol ratio was slightly lowered during the febrile period and markedly increased during the jaundice period.

E. H.

KINGSBURY (A. Neave). **An Attempt to transmit *L. icterohaemorrhagiae* by *A. argenteus* and *A. albopictus*.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927*. Vol. 2. pp. 544-547. [3 refs.] [Inst. for Med. Research, Kuala Lumpur, F.M.S.]

The author fed *Aedes argenteus* and *A. albopictus* on guinea-pigs infected with a virulent strain of *Leptospira icterohaemorrhagiae*, when the organisms were present in the blood. Subsequently these mosquitoes were fed on normal guinea-pigs. In no case was any infection produced, and three weeks after the original feeding the surviving mosquitoes were dissected and examined for leptospirae with negative results.

E. H.

ADAMSKI (J.). Eine Agarmethode zur Reinzüchtung von Wasser-spirochäten, insbesondere vom Weiltyp. [**An Agar Method for the Pure Culture of Water Spirochaetes, especially of the Weil Type.**—*Zent. f. Bakt.* I. Abt. Orig. 1929. June 28. Vol. 112. No. 6/8. pp. 476-480. [6 refs.] [Microbiol. Inst., Univ., Posen.]

This method depends on the greater motility of spirochaetes, in a viscous medium, in comparison with that of spirilla and ordinary bacteria. In a medium containing 1.2 to 1.5 per cent. agar the spirochaetes are able to penetrate into the depth of the medium, whilst bacteria remain on the surface.

The author uses a medium containing 1.2 to 1.5 per cent. agar and 0.25 per cent. human faeces; the mixture is steamed, filtered, the pH adjusted

to 7 to 7·2, and finally autoclaved for 15 minutes at 120° C. The medium is then poured in Petri dishes in a layer 1 to 1·5 cm. thick. When the surface is moderately dry, the plate is inoculated in the centre with the material containing spirochaetes and the plates, bottom downwards, are incubated at room temperature for 8 to 15 days. The spirochaetes can be obtained from the depths of the agar and pure cultures can be made by transferring to any suitable medium, such as Noguchi's serum agar. If the water to be examined contains few spirochaetes it is advisable to enrich the growth by Hindle's method before inoculating the agar plates. By these means the author has been able to cultivate leptospirae from almost every sample of water examined, and the method is also recommended for the isolation of water spirochaetes of the *buccalis* or *Treponema* type.

E. H.

RAT-BITE FEVER.

GRABOW (C.) & STRUWE (F.). Beitrag zum Vorkommen des Erregers der Rattenbisskrankheit (*Spirillum morsus muris*) und zu seinem Verhalten im Tierversuch. [**A Study of the Appearance of the Causative Agent of Rat-Bite Fever (*S. morsus muris*) and its Behaviour in Animal Experiments.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Aug. 21. Vol. 113. No. 5/6. pp. 418-425. [28 refs.]

The author isolated two strains of this organism from wild rats. Although their blood was negative to microscopical examination, spirilla could be found without any difficulty in the blood of mice and guineapigs inoculated from them. The nature of the infection was studied in guineapigs and rabbits, especially the latter. The authors' results differ slightly from MOOSER's [see this *Bulletin*, Vol. 23, p. 122] as regards the persistence of the spirilla in the inner organs and glands and the appearance of skin lesions, but the differences are only quantitative, not qualitative. The characteristic skin lesions with alopecia were only observed in albino rabbits. Immune bodies were found in the blood of rabbits, and the immunity of recovered animals is considered to depend on these antibodies, and not on a persistent infection. The central nervous system seems to have no affinity for the organism, for this part of the body was negative when other organs were positive.

E. Hindle.

FISCHL (Viktor). Zur Kenntnis der experimentellen Sodoku. [**The Study of Experimental Sodoku.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1929. Oct. 12. Vol. 110. No. 3. pp. 499-505. [15 refs.] [*Psychiat-Neurol. Clinic*, Univ., Heidelberg.]

The author studied a strain of *Spirillum minus* that was highly virulent for man, and in rats and mice produced typical infections, but was not pathogenic to guineapigs. In infected rats and mice the spirilla were common in the peripheral blood for 3 weeks after inoculation and afterwards became very scanty. Three gold preparations, solganal, solganal B, and lopion, were tested on these infections, but had no effect. Myosalvarsan in doses of 0.05 gm. was found to be very effective both for treatment and also as a prophylactic agent. Rats that had received an injection 3 weeks before inoculation of the spirillum still showed traces of protection, as evidenced by a lengthening of the incubation period.

E. H.

RUYS (A. Charlotte). Ueber *Spirillum minus*, dem Erreger der Rattenbisskrankheit. [**On *Spirillum minus*, the Causative Agent of Rat-Bite Fever.**]—*Seuchenbekämpfung.* Vienna. 1929. Vol. 6. No. 3. pp. 195-201. With 8 figs. [13 refs.] [*Inst. of Trop. Hyg., & Hyg. Inst., Univ., Amsterdam.*]

The author examined 100 rats in Amsterdam by Joekes' method which consists of inoculating a guineapig with skin from the rat under investigation, but only found this spirillum in one individual, which also showed them in its blood. Various animals were infected with this and three other strains, and the author gives a general account of the disease.

E. H.

AKAZAWA (S.). **Studies on the Drug-Fastness of Rat-Bite Fever Spirochete, *Spirochaeta morsus-muris*. I. Bismuth-Fastness.**—*Jl. Japan. Soc. Vet. Sci.* 1929. June. Vol. 8. No. 2. pp. 95–116. [25 refs.] [In Japanese. English summary pp. 117–118.] [Govt. Inst. for Vet. Research, Fusan, Japan.]

The author obtained a bismuth resistant strain of *Spirillum minus* by repeated injections of neotrepol (a bismuth preparation) into mice infected with rat-bite fever. This strain was then found to be resistant to the action of other bismuth compounds such as muthanol and casbis. The resistance was still present after 50 passages through mice during two years, and also after passage into a rat. When mice infected with this resistant strain are repeatedly treated with compounds not containing bismuth, the resistance occasionally disappears. Thus in mice the Bi-resistant strain seems to lose its peculiarity and return to normal after 10 injections of neosalvarsan (1 : 1,000), and silver salvarsan and Bayer 205 also had some effect. Trypaflavin and parafuchsin, on the other hand, did not alter the bismuth resistance of the strain. The resistant and normal strains gave similar infections in mice, rats and guineapigs. In splenectomized mice the resistant strain showed a slightly higher virulence than the normal strain. When the reticulo-endothelial system of mice was blocked with saccharated iron oxide or Indian ink, the animals were equally susceptible to both strains. The spirilla in these mice showed an increased tolerance to neosalvarsan. The resistant strain was found to be more sensitive to Bayer 205 and neosalvarsan, for in the case of the former drug the Bi-resistant strain was still sensitive to Bayer 205 after ten injections; whilst the normal strain became arsenic resistant after five injections. The Bi-resistant strain showed an increased resistance to the action of combined neotrepol and Bayer 205, but was more susceptible to the two drugs than the action of Bayer 205 itself. When parafuchsin, ethyl-violet or tryparosan was combined with 1 : 1,000 neosalvarsan, the resistant strain showed a higher susceptibility than the original strain.

E. H.

ROSE (Werner J.). **Report of a Case of Rat Bite Fever.**—*Bull. Buffalo General Hosp.* 1929. June. Vol. 7. No. 1. pp. 20–21. With 1 text fig. [4 refs.]

The record of a case of this disease in Buffalo, U.S.A., following the bite of a rat. The patient was cured by four injections of neoarsphenamine, in doses of 0.3 gm. to 0.9 gm. at 3 to 5 day intervals. Examination of the patient for *Spirillum minus* gave negative results, but a rat caught in the patient's home contained these organisms in both the heart blood and washings from the mouth and nose, as determined by inoculation into guineapigs.

E. H.

SMALLWOOD (R. P.). **Rat-Bite Fever from the Bite of a Pig.** [Memoranda.]—*Brit. Med. Jl.* 1929. June 29. p. 1159.

A record of a case of this disease, diagnosed entirely on clinical grounds, in a woman which developed after she had been bitten by a young pig. An injection of 0.6 gm. novarsenobenzene caused the fever to disappear, and the patient showed an uninterrupted recovery.

E. H.

IYER (M. A. Krishna). **A Case of Rat-Bite Fever.**—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. p. 571.

The record of a case of this disease, diagnosed clinically, in a patient at Madras, who was bitten by a bandicoot. After six months' illness, treatment with neosalvarsan was followed by complete recovery after 2-3 injections.

E. H.

ANGUERA (A.). El primer caso de sodoku en Guipuzcoa. [**The First recorded Case of Rat-Bite Fever in Guipuzcoa.**]—*Medicina Países Cálidos.* Madrid. 1929. July. Vol. 2. No. 4. pp. 359-360.

The record of a probable case of rat-bite fever, diagnosed on clinical grounds, which was cured by the use of neosalvarsan. The spirillum was not found.

E. H.

CAMPBELL (Horace Emerson). Rat Bite Fever.—*China Med. Jl.* 1929. Sept. Vol. 43. No. 9. pp. 931-933.

UNDULANT FEVERS.

KRISTENSEN (Martin) & HOLM (Per.). Bakteriologische und statistische Untersuchungen über *Febris undulans* in Dänemark. [**Bacteriological and Statistical Study of Undulant Fever in Denmark.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. May 28. Vol. 112. No. 3/4. pp. 281–312. With 2 text figs. [30 refs.] [State Serum Inst., Copenhagen.] [Summary appears also in *Bulletin of Hygiene.*]

In a previous paper [this *Bulletin*, Vol. 26, p. 65] the author has recorded the bacteriological findings in 89 cases of undulant fever in Denmark, apparently due to infection with Bang's bacillus of bovine abortion (*Br. abortus*). In the present report he reviews a series of 500 cases, observed during the period April 1st 1927–December 1st 1928. The serum of each of these cases agglutinated a suspension of *Br. abortus* to a titre of 1 : 100, or higher. The bacillus was isolated from 23 cases : in 21 instances from the blood, once from an ovarian abscess, and once from the placenta in a case of human abortion. The inoculation of guineapigs with a considerable number of these human strains, and of other guineapigs with strains of *Br. abortus* derived from cattle, revealed no significant difference between the two series. There was no evidence that the human strains were more virulent than the bovine for these animals. Agglutination tests, including cross-absorption tests, revealed little if any difference between any of the human or bovine strains examined. A few tests with a *Br. melitensis* serum showed a sharp differentiation between the homologous strain and a bovine *Br. abortus* strain. Grown on liver agar, with the addition of methyl-violet or of thionin, the human strains resembled the bovine strains, in that they were completely, or very markedly, inhibited by thionin, but were little, or not at all, affected by methyl-violet. The two *melitensis* strains tested and a single porcine strain of *Br. abortus* were inhibited by methyl-violet, but not by thionin. All the Danish strains, whether of human or bovine origin, refused to grow, on first isolation, under ordinary aerobic conditions, without the addition of CO₂. Experiments on the lines of those recorded by McALPINE and SLANETZ showed some divergence in glucose-utilization between the human and bovine strains on the one hand, and the porcine strains on the other. No clear-cut differences could be detected between the strains as regards H₂S production. The authors conclude that all the available evidence suggests that the human strains isolated in Denmark are identical with *Br. abortus* of bovine origin, but can be differentiated from *Br. melitensis* and from strains of *Br. abortus* of porcine origin.

Epidemiological and statistical studies, including details of the age, sex and occupation of the patients, and the topographical and chronological distribution of the cases, yielded results which lent support to the view that cattle formed an important source of infection, but they suggested that infection occurred, in the majority of cases, in other ways than through the consumption of milk or of milk products.

W. W. C. Topley.

DUFFAU. De l'utilisation du laboratoire dans le diagnostic de la fièvre ondulante. [**The Use of the Laboratory in the Diagnosis of Undulant Fever.**]—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 486–491. [Oran Hosp., Oran, Algeria.]

Undulant fever is endemic in Oran, and the author has made a particular study of the disease in recent years. The laboratory pro-

cedures which he employs for diagnosis are blood culture, agglutination reaction, and melitene reaction. Blood culture is the procedure of choice. There does not seem to be any particular period of the disease when the germ is more readily isolated from the blood than at others.

For example, out of 80 positive blood cultures—

30 were in the first 15 days.

15 in the 3rd and 4th week.

10 in the 2nd month.

3 in the 3rd month.

2 during the 6th month of the disease.

Two cc. of blood is usually sufficient in 20 cc. of ordinary peptone broth of a pH. of 7.1, that is, slightly on the alkaline side. This he considers is as good as any other culture medium. The blood should be well shaken up in the tube, and small sterile glass rods are used for defibrination. The growth begins to appear about the 2nd day.

For agglutination tests the selection of the strain is most important, and, as far as possible, it should be one which will be agglutinated by specific sera only, and not by heterologous. Three strains are employed for each test. Any titre over 1/30 is taken as diagnostic.

For the intradermal test the author employs an emulsion of the three test strains. He injects 1/10 cc. of melitene into one arm and 1/10 cc. of the killed emulsion into the other. The reaction was positive in all the cases which gave a positive blood culture, but a modified result was obtained in eight cases of typhoid and in two normal people.

D. Harvey.

FAVILLI (Giovanni). Osservazioni sopra una epidemia di febbre ondulante nella provincia di Firenze. [**On an Outbreak of Undulant Fever in the Province of Florence.**—*Sperimentale*. 1929. Vol. 83. No. 5. pp. 515–525. [9 refs.] [Inst. General Path., Univ., Florence.]

In Barberino di Mugello, a market-town some 30 kilometres from Florence, an outbreak of undulant fever occurred last spring involving 35 persons. There were no goats in the district, nor any cases of contagious abortion among the cattle, but many of a flock of sheep had aborted. The owner of the flock made and sold cheese. Although infection of the cows could not be absolutely excluded, the source of this outbreak is believed to have been the disease in the sheep. The organism isolated from human cases did not possess the characteristics of *Br. abortus* but those of *Br. paramelitensis*.

H. Harold Scott.

VERCELLANA (G.). Sul potere patogeno per l'uomo e per la scimmia dei batteri di Bruce e di Bang. [**The Pathogenicity of *Brucella melitensis* and *Br. abortus* for Man and Monkey.**—*Giorn. di Clin. Med.* 1929. July 20. Vol. 10. No. 10. pp. 634–636, 639–642, 645. With 2 charts. [Inst. of General Path. & Bact., Univ., Parma.]

—. Expériences sur le pouvoir pathogénique pour les singes du bact. de Bang provenant de chèvres, et du bact. de Bruce provenant de vaches.—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia*. Milan. 1929. Aug. Vol. 1. No. 8. pp. 175–177. [Inst. of General Path. & Bact., Univ., Parma.]

The author injected intravenously into two *Macacus sinicus* 10 million *Br. melitensis* (Langhirano strain obtained from a human

case) after passage through a cow. Typical attacks of undulant fever ensued, of which the charts are given, thus showing that *Br. melitensis* of human origin does not lose its virulence for a susceptible animal by being passed through cattle. Next he injected intravenously into each of two more monkeys (*M. sinicus*) 10,000 million *Br. abortus* isolated from cows and subsequently passed through a goat. A slight rise of temperature resulted, which is ascribed to heterogeneous protein. Repeated haemocultures were negative, although the serum agglutinated in a titre of 1 : 400. The conclusions drawn from these experiments are : (1) That *Br. abortus*, after passage through the goat, does not acquire increased virulence for the monkey ; (2) That *Br. melitensis*, after passage through the cow, does not suffer any loss of virulence for the same animal (*M. sinicus*). The crucial test of substituting man for the monkey has not been tried, but, by analogy, the question of the pathogenicity of Bang's bacillus for man, the author maintains, is still unproved.

H. Harold Scott.

ALBISTON (Harold E.). **The Occurrence of *Brucella abortus* (Bang) in Market Milk and its Relation to Disease in Man.**—*Med. Jl. Australia*. 1929. June 29. 16th Year. Vol. 1. No. 26. pp. 863-864. [4 refs.] [Vet. Research Inst., Univ., Melbourne.]

During the last two years an investigation has been in progress at the Veterinary Research Institute, University of Melbourne, to determine the prevalence of tubercle bacilli in the metropolitan milk supply in the city. This work included the examination of milk from nearly 1,300 dairy farms, and the presence or otherwise of tubercle bacilli was judged by the effect on guineapigs inoculated with the milk.

It was noted that a certain percentage of the guineapigs showed at autopsy a pathological condition resembling tuberculosis in its macroscopical appearances. This condition, characterized by lymphadenitis and enlarged spleen, was found on further investigation to be due to *Br. abortus*. At the conclusion of the investigation it was found that 24.5 per cent. of the farms were supplying milk containing *Br. abortus*.

As infection of man with *Br. melitensis* is not known to occur in the state of Victoria, the author considers that much light might be thrown on infection of man with *Br. abortus* if a careful lookout was kept for cases. He suggests, therefore, that all sera sent to laboratories for the Widal reaction in cases of fever should also be tested for agglutinins for *Br. abortus*, and, if these should be found, attempts should be made to isolate the organism and to identify it.

D. H.

BAKER, JR. (B. M.). **Undulant Fever presenting the Clinical Syndrome of Intermittent Hydrarthrosis.**—*Arch. Intern. Med.* 1929. July. Vol. 44. No. 1. pp. 128-141. With 6 figs. [31 refs.] [Med. Clinic, Johns Hopkins Univ. & Hosp., Baltimore.]

This is a report of an interesting case of infection with *Br. abortus* in a man aged 47.

The first symptom noted by the patient was swelling of the right knee ; this swelling began to disappear after two days, when the left knee commenced to swell. This process of intermittent and alternate swelling of the knee joints continued regularly for nearly seven months, and was accom-

panied by irregular fever. Thick fluid was drawn off from the knee joints on several occasions and *Br. abortus* was cultivated therefrom and the same organism was obtained by blood culture.

An autogenous vaccine was given, the fever ceased and the swelling of the knees also stopped. Similar cases of intermittent hydrarthrosis have been described before, but no cause has ever been discovered; the author suggests that some, at least, of these cases may have been *Brucella* infections and urges that, if further cases should be met with, careful bacteriological investigations should be carried out.

D. H.

HOFFMAN (Arthur M.). **Treatment of Undulant Fever with Acriflavine.**—*Jl. Amer. Med. Assoc.* 1929. June 29. Vol. 92. No. 26. pp. 2169-2171. With 3 charts in text. [14 refs.]

The author points out that up to the present there is no drug which can be said to be a specific for the treatment of undulant fever; the treatment is symptomatic. Vaccine treatment has given good results in some cases but in others has been of little avail.

Italian physicians have reported good results from the use of acriflavine intravenously in doses of 0.01 gm. per kilo. of body weight. The author attempted acriflavine therapy in two cases of undulant fever and the success following on these attempts prompts this publication. Both cases were typical of undulant fever and, although blood culture was not positive, the agglutination reaction with *Br. abortus* was diagnostic. In both cases the fever commenced to fall by lysis after the first intravenous injection and reached normal seven or eight days later. The only criticism is that the treatment was not commenced until the fever had lasted over six weeks in one case and two months in the other. That this criticism is valid is indicated by the fact that in a third case, which was not treated by acriflavine, the fever was of shorter duration than in the two treated cases. At the same time the author is convinced that the drug had a favourable influence on the course of the disease and urges its use in further cases.

D. H.

VEGNI (Remo). Ricerche sulla chemioterapia dell'infezione Maltese. (II Nota). [**Studies in the Chemotherapy of Undulant Fever.**]—*Giorn. di Batteriol. e Immunol.* 1929. Apr. Vol. 4. No. 4. pp. 293-306. [17 refs.]

In order to study the effects of rivanol the author first put up a series of tests to determine its bactericidal effect on *Br. melitensis* in vitro, and found that a strength of 1 in 250,000 in water sufficed to kill the organisms after 14 hours' contact. The use of glucose broth greatly lowered the bactericidal effect, growth occurring in dilutions higher than 1 in 20,000; with addition of 20 per cent. agglutinating human serum, the zone of inhibition occurred at 1 in 50,000.

Application of the drug was then made to undulant fever patients; 25-50 cc. of a 0.1 per cent. solution of rivanol in freshly distilled water were injected intravenously. The effects were to reduce the temperature somewhat and to produce a feeling of improvement, but these results

were only transient. It may be that the reduction of the bactericidal effects on contact with human serum, as shown by experiment, will set a definite limit to the therapeutic use of rivanol.

H. Harold Scott.

AMOSS (Harold L.) & POSTON (Mary A.). **Undulant (Malta) Fever. Isolation of the Brucella Organism from the Stools.**—*Jl. Amer. Med. Assoc.* 1929. July 20. Vol. 93. No. 3. pp. 170-171. [8 refs.] [Med. Clinic, Johns Hopkins Univ. & Hosp., Baltimore.] [Summary appears also in *Bulletin of Hygiene.*]

Employing the method of preliminary flocculation with a specific agglutinating serum, the authors have succeeded in isolating strains of *Brucella* from the faeces of two cases of undulant fever. In one case the strain isolated was of the *melitensis* type, in the other it showed the characters of the porcine variety of *Br. abortus*.

The technique adopted was as follows. About 1 gm. of fresh faeces was suspended in 50 cc. of sterile saline and shaken for a few minutes. The suspension was filtered through four layers of gauze and then centrifuged at half speed for three minutes. To the supernatant suspension an agglutinating serum was added, in such an amount as to give a final dilution of 1:100. The mixture was incubated for 2 hours at 37° C. ; it was then centrifuged at half speed for 5 minutes, and the supernatant fluid discarded. The deposit was resuspended in saline, well mixed, and centrifuged again. This procedure was twice repeated. Finally the precipitate was spread with a bent glass rod on eosine-methylene-blue plates, some of which were incubated at 37°C. aerobically, and others in an anaerobic jar containing 10 per cent. CO₂.

W. W. C. Topley.

DECHIGI-DECLICH (Melchiorre) & FAVIA (Nicola). Tentativi di immunizzazione coll' antivirù alla Besredka nella febbre ondulante. [**Attempts at Immunization against Undulant Fever by Means of Besredka's Anti-Virus.**].—*Giorn. Batteriol. e Immunol.* 1929. May. Vol. 4. No. 5. pp. 401-413. [7 refs.] [Hygiene Inst., Univ., Florence.]

The authors' experiments were directed to two ends. First, to determine whether there was any anti-virus present in the filtrate of a broth culture of *Brucella*; secondly, if the result was positive, to test its capability of conferring immunity to infection.

Having obtained a filtrate and placed some of it in each of two tubes, they sowed *Brucella* (both *melitensis* and *abortus*, which had been employed in obtaining the original growth) in one and staphylococci in the other, controlling by inoculation of a tube of nutrient broth with the former. The staphylococcus and the control tubes both gave a growth, the other remained clear, showing that the filtrate had inhibited growth.

For animal experiment they used rats, in whom the disease runs a rapid course, as well as guineapigs and rabbits. They found that after injection with the anti-virus the animals did not systematically behave differently from controls without it, and consequently they

could not confirm any efficacious immunity from its use. On the other hand, judging from a leucocytosis which always followed injection of the filtrate in rabbits, the anti-virus is believed to lead to a certain stimulating effect on the defensive powers in this animal.

H. Harold Scott.

ZANZUCCHI (A.). Immunizzazione preventiva della vacche con bacilli di Bang vivi e virulenti contro l'aborto epizootico ed epidemiologia della febbre ondulante. [**Prophylactic Immunization of Cows against Epizootic Abortion with Living and Virulent *Br. abortus* and the Epidemiology of Undulant Fever.**—*Giorn. di Clin. Med.* 1929. July 20. Vol. 10. No. 10. pp. 629-630, 633. [Inst. of General Path. & Bact., Univ., Parma.]

As a preventive of epizootic abortion vaccination with living and virulent cultures of Bang's bacillus has been commonly practised in recent times. The author used freshly isolated strains from cows in Parma and Reggio Emilia; he grew them on 2 per cent. glucose agar for 48 hours at 37° C., and made an emulsion in 1 per cent. salt solution, putting up the product in vials of 10 and 20 cc., containing 100 million organisms per cc. For immunization the contents of the vials were injected in two doses at an interval of 15 days into the subcutaneous tissue of the caudal fold or behind the scapula. 2,500 cows were thus inoculated, and by examination of milk and urine during a period of four months after the second injection he proved that virulent bacilli were being excreted. He also kept under observation 3,800 individuals engaged on the farms or drinking the milk of these cows. The records of notified diseases showed that in these two districts the number of cases in Parma of undulant fever in a period [length not stated] prior to the injection was three, and the same subsequent to the vaccination; in Reggiano the number was six in each period; in other words, there was no increase in the cases recorded. Had the bacillus been *Br. melitensis* there would have been a widespread epidemic. The inference is that *Br. abortus* is non-infective, at least non-pathogenic, for man.

H. Harold Scott.

ASCOLI (M.) & SANFILIPPO (E.). **Vaccination of the Goat against *Micrococcus melitensis* Infection.**—*Jl. Trop. Med. & Hyg.* 1929. Oct. 15. Vol. 32. No. 20. pp. 289-290. [10 refs.] [Med. Clinic, R. Univ., Catania.]

This is a summary of the work of these authors on the immunization of goats against *Brucella melitensis* infection. The original papers were noticed in this *Bulletin* [Vol. 26, pp. 445 and 830]. Their conclusions are that a clear immunity may be established in goats against *Br. melitensis* infection by massive injection of at least 12 to 16 platefuls of killed culture on two occasions with an interval of eight days. They are continuing their observations and hope to be able to show that kids 3 to 4 months old can be protected, by vaccination, from infection, even after pregnancy and subsequent lactation.

D. H.

CANTANI (F.). Contribution expérimentale à la différenciation du micrococcus mélitensis et du bacille de Bang. [*Differentiation of Br. melitensis and abortus.*—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1929. Aug. Vol. 1. No. 8. pp. 194–195.]

— Sulla differenziazione del micrococco melitense e del bacillo di Bang. Nota preventiva. *Giorn. di Clin. Med.* 1929. Sept. 20. Vol. 10. No. 13. pp. 827–828. [Summary appears also in *Bulletin of Hygiene.*]

By earlier experiments the author considered that he had established a marked difference between *Br. melitensis* and *Br. abortus* as regards pathogenicity for rabbits.

He has carried out further research, injecting intracranially, after trephining, emulsions of 48-hour agar cultures of four strains of *Br. melitensis* and five of *Br. abortus*. He was unable to confirm his former conclusions; differences practically as great were noticed between the results of various strains of the same organism as had been seen previously between the two bacilli. Guinea-pigs were found to react in a similar way. So far, therefore, pathogenicity for laboratory animals has not revealed a means of distinguishing these organisms from one another.

H. Harold Scott.

BIANCHINI (Antonio). Il comportamento delle Brucelle abortus e melitensis di fronte ad alcuni prodotti chemioterapici in vitro.—*Nuova Vet.* 1929. Oct. 15. Vol. 7. No. 10. pp. 10–12. [Inst. of Vet. Med., Turin.]

VEGNI (Remo). Ricerche sperimentali di differenziazione del micrococco di Bruce dal bacillus abortus di Bang.—*Giorn. Batteriol. e Immunol.* 1929. May. Vol. 4. No. 5. pp. 448–456. [77 refs.]

DENGUE AND PAPPATACI FEVER.

RUSSIAN JOURNAL OF TROPICAL MEDICINE. 1929. Vol. 7. No. 3.
pp. 201-202. Conférence de la dengue. [Conference on Dengue.]

Conference on dengue held at Moscow on 5th and 6th March, 1929.
The following conclusions were arrived at :—

The fact that the *Aedes aegypti* is widely spread in the Soviet Republics constitutes a menace of the introduction of dengue into the country. This being admitted, the following measures should be taken.

(a) A special Commission should be appointed, composed of representatives of the various scientific bodies, including the Institutes of Tropical Medicine, with power to co-opt to their numbers. The Commission should meet monthly.

(b) The Institutes of Tropical Medicine and Anti-Malarial Stations should organize a rigorous search to define the limits of the habitat of *Aedes* mosquitoes and study their biology with a view to taking measures to destroy them.

(c) On a line of the shores of the Black Sea to the south of the 43rd parallel active measures should be taken to destroy this mosquito; north of this a study of the distribution is sufficient.

(d) The various Institutes are each given an area of territory for which they are responsible.

D. Harvey.

PUBLIC HEALTH REPORTS. 1929. Aug. 30. Vol. 44. No. 35.
pp. 2106-2107.—Plan for International Agreement regarding Dengue.

A plan for international agreement regarding dengue was approved at the Session of the Permanent Committee of the International Office of Public Hygiene held in May of this year.

" 1. When dengue shall appear in epidemic form in one of the countries participating in the present agreement, the highest health authority of the country shall notify the other participating countries.

" It shall keep the International Office of Public Hygiene informed as to the movement of the epidemic.

" 2. When an epidemic of dengue is reported in a port or in the region near a port, the sanitary authority of said port shall recommend to the captains, and eventually to the ship's doctors, the carrying out, as soon as possible after leaving the port, of a search for and destruction of mosquitoes and their larvae in all accessible parts of the ship, especially in the cabins, baggage rooms, stewards' rooms, kitchens, heating apparatus, water tanks, and all places especially likely to give shelter to mosquitoes.

" It shall urge the physician, or, in the absence of a physician, the captain, to take the necessary precautions so that, if cases of dengue occur on board, the patients can be isolated in places where they cannot be bitten by mosquitoes.

" 3. Every ship coming from a port where an epidemic of dengue is in progress and arriving in a port where where the sanitary authority has reason to fear that the disease may be spread, by reason of the presence of a large number of mosquitoes which are likely to transmit it, may be subjected to the following measures :

" (a). Interrogation, and reply by the physician, or, in his absence, by the captain, to the question : ' Are there, or have there been, on board persons suffering from dengue? '

"(b). Medical inspection.

"Patients suffering from dengue for less than five days who desire to leave the ship will be taken off immediately, and isolated on land, following instructions from competent sanitary authorities, in places where they will be protected from mosquito bites, until the expiration of five days from the onset of the disease.

"(c). Inspection of the ship with a view to ascertaining that no *Stegomyia* [*Aedes*] exist, with the reservation that measures taken en route will be considered. In the case that the presence of *Stegomyia* [*Aedes*] has been reported on board, the sanitary authority of the port shall carry out the destruction of the mosquitoes.

"(d). By exception, the sanitary authority of the port may, if he considers it necessary by reason of circumstances, place the disembarked passengers under surveillance, and confine the baggage on board until the expiration of eight days after exposure to risk."

D. H.

BOYÉ. Une épidémie de dengue en Cochinchine, en 1927. [**Dengue Epidemic in Cochin China in 1927.**—*Bull. Office Internat. d'Hyg. Publique*. 1929. Sept. Vol. 21. No. 9. pp. 1546-1548.

There had been only sporadic cases of dengue in this district for some years, but in May, 1927, several cases appeared. The disease spread with great rapidity and within a few weeks there were thousands of cases. In the following season only a few cases occurred, and those in persons who had been attacked in the previous year.

The author is unable to explain this sudden outbreak. *Stegomyia* mosquitoes are common in the area, but they were no more numerous in 1927 than in 1926 or in 1928. It was noted that the use of the mosquito net was not so efficient a safeguard against this disease as it is against malaria, and that cases were not more numerous in the country where mosquitoes are plentiful than in the towns where they are few. The author is of opinion that these findings are not in keeping with the theory that the mosquito is the one and only transmitter of infection. Clinically the disease was typical and the mortality nil.

It was noted that people who were under treatment for syphilis with novarsenol-benzol, or amoebic dysentery with stovarsol, readily contracted dengue.

D. H.

GARIN (Ch.). La dengue. [**Dengue.**—*Rev. Prat. Malad. des Pays Chauds*. 1928. Oct. Year 7. Vol. 8. No. 10. pp. 505-508.

CLELAND (J. Barton). **Dengue Fever in Australia.**—*Ibid.* pp. 509-514. [6 refs.]

i. A résumé of recent knowledge of dengue, in view of the epidemics in Greece and elsewhere. The author refers to the work of COUVY on the spirochaetes and describes these parasites, but adds, "nevertheless further research is necessary to put the nature of the virus of dengue beyond a doubt." The symptomatology, diagnosis, etc., are fully discussed.

ii. Dengue was first noted as epidemic in Queensland in 1885, and later epidemics occurred in 1891-97-98, 1904-05-16-17-25 and 1926. The disease remained true to type and was and is still classical dengue fever. Australia, being free from other dengue-like diseases, is therefore

suitable for the elucidation of the etiology. BANCROFT in 1906 noted that persons who visited Brisbane and only stayed there during the day contracted dengue, and he concluded that a day-biting insect must convey the disease, and this suggested *Stegomyia* rather than *Culex*. He experimented with this mosquito and one person bitten developed dengue twelve days after, but the possibility of natural infection could not be excluded.

Dengue is not naturally contracted south of Newcastle, N.S.W., yet *Culex* is spread all over the continent; whereas *Stegomyia* is limited to the same areas as dengue.

The author and his co-workers in 1916 collected *Aedes* mosquitoes in Brisbane and conveyed them to Sydney and there fed them on volunteers and they developed the disease in an area where dengue was unknown. Similar experiments with *Culex* were unsuccessful. The incubation period in these cases was from five to ten days. Blood serum was shown to be infective and also filtered serum. Infective blood kept in the cool, infected after seven days. Repeated passage by inoculation from man to man produced no change in the nature of the disease.

D. H.

JORGE (Ricardo). La dengue. A propos d'une épidémie nautique dépitée à Lisbonne. [**An Account of a Ship Outbreak of Dengue diagnosed at Lisbon.**]*—Bull. Office Internat. d'Hyg. Publique.* 1929. Sept. Vol. 21. No. 9. pp. 1531-1545. [18 refs.]

There had been no dengue in Portugal until the arrival of the Danish cargo steamer "Thyra" in the harbour of Lisbon. This steamer reached Dakar (West Africa) on September 3rd, 1928, stayed there for six days, made a trip to some other local ports, returned to Dakar for two days, and sailed for Copenhagen on September 22nd. When off Lisbon the captain was compelled to discontinue his voyage as the entire crew, with two exceptions, were incapacitated by illness; the ship anchored in the harbour of Lisbon on October 3rd. The crew numbered 15 and there was one passenger; only this passenger and 2 of the crew were not ill. The first case, the cook, occurred on September 26th, the fourth day of the voyage, and the last case occurred on October 2nd, the tenth day of the voyage; the ship arrived at Lisbon next day.

The cases were at once diagnosed dengue; clinically they were of classical type. It was obvious that the infection had taken place in Dakar, where dengue is endemic. The author cites several instances where ships calling at that port have had many cases of dengue on board.

A very careful examination of the "Thyra" was made by Port Health Authorities, but only a few *Culex fatigans* mosquitoes could be found on board and no *Aedes*: the author therefore considers that the infection took place on shore at Dakar.

There follows a discussion of the relation between dengue and sandfly fever. The author takes the orthodox view that these two diseases are distinct; he also agrees that dengue, yellow fever and Weil's disease are clinically, epidemiologically and etiologically different.

D. H.

LEGENDRE (J.). Au sujet de la pathogénie de la dengue. [**The Pathogeny of Dengue.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 419–423. [1 ref.]

This is a criticism of the paper of CARDAMATIS (see this *Bulletin*, Vol. 26, p. 833) in which he asserts that three-day fever, and dengue (*Aëdes*) are due to one and the same cause.

Legendre considers, and most will agree with him, that the above statement cannot stand in view of known facts, some of which he proceeds to tabulate as follows:—

(1) Dengue (malady carried by *Aëdes*) occurs in countries where sandflies are unknown.

(2) Three-day fever exists where *Aëdes* is not to be found.

(3) In countries where both insects occur the diseases co-exist.

Clinically the two diseases can be readily differentiated. It is well known that in certain countries where *Aëdes* alone is found mild cases of dengue are seen, without rash and with a fever of three days' duration: and in other areas where there is only *Phlebotomus* you find quite severe cases of sandfly fever lasting five to six days.

In the discussion, CAZANOVE was inclined rather to favour the opinion of CARDAMATIS. He had seen typical dengue in districts where *Stegomyia* was non-existent and sandflies numerous, and typical three-day fever in districts where *Stegomyia* was the only pest. He was of opinion that sandfly fever, dengue and yellow fever were very closely allied, and that although typical cases could be definitely diagnosed, yet there were anomalous cases of all three which it was impossible to place correctly. He concluded by saying that the case should be taken as not proven until some definite bacteriological or serological test was devised which permitted one clearly to differentiate between sandfly fever and dengue.

D. H.

STEFANOPOULOU (G.). Sur les rapports étiologiques de la dengue et de la fièvre jaune. [**The Etiological Relations of Dengue and Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 538–540. [6 refs.]

BLANC and his collaborators showed that the anti-yellow fever serum of the Pasteur Institute was without action on the virus of dengue [this *Bulletin*, Vol. 26, p. 839]. The author of the present paper carried out some experiments which show that the serum of dengue convalescents is without action on the yellow fever virus.

Thus a macacus monkey received a mixture of a fatal dose of yellow fever virus (emulsion of liver) and 2 cc. of the serum of a patient convalescent from dengue; six days later the animal died of typical yellow fever, and the liver served to carry on the virus to other monkeys. Two monkeys were infected with dengue virus (blood of patient); one was bled 17 days later and its serum, mixed with a fatal dose of yellow fever virus, was inoculated into a third monkey; this monkey died of yellow fever four days later. The second monkey eleven days after receiving the dose of dengue virus was inoculated with a fatal dose of yellow fever virus and died five days later.

The above experiments confirm the work of BLANC and show that, from the point of view of immunology, dengue fever and yellow fever are separate and distinct diseases.

D. H.

PHOTAKIS (B. A.). Die klinischen Äusserungen des "Denguefiebers" im Lichte der Obduktionsbefunde. [**The Clinical Signs of Dengue in the Light of the Post-mortem Findings.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. June. Vol. 33. No. 6. pp. 333-335. [Pasteur Inst., Athens.]

The spleen was not enlarged and no histological changes could be found. The liver, on the other hand, was usually enlarged and this enlargement was due to a hyperaemia. In cases which had showed during life bradycardia some degenerative changes were found in the heart muscle. The muscle weakness and myalgia of the striped muscle is evidence also of a like change of this structure.

The author considers that these four points in the post-mortem of dengue are specific and distinguish the disease readily from other acute fevers.

In some cases which had shown evidence of nephritis during life no change could be found in the kidneys. It is considered that the haematuria is part of the general haemorrhagic condition and not due to an inflammation of the kidneys. Although the slow pulse and other symptoms are attributed to suprarenal insufficiency, no changes were found in these organs.

D. H.

MANUÉLIDIS. Dengue (complications de l'épidémie d'Athènes). [**Complications of Dengue.**—*Rev. Prat. Malad. des Pays Chauds.* 1929. Jan. Year 8. Vol. 9. No. 1. pp. 666-668, 671-674.]

In view of the fact that there were over one million cases of dengue in Greece among a mixed population, where malaria, etc., is rife, the author remarks that it is not surprising that nearly all the possible complications of an infectious malady were met with. But he deals in this paper with the complications peculiar to dengue which concern principally the nervous and circulatory systems. The virus of dengue is peculiarly neurotropic, as evidenced by the pains in the back and limbs and the effects on the sympathetic system. A condition of meningo-encephalitis has also been observed and various monoplegias and hemiplegias and peripheral neuritis. As regards the circulatory system the heart, as a rule, retains its functions unimpaired, but arteritis and phlebitis have been noted. An interesting point is the fragility of the capillaries with resulting haemorrhages in and from various organs, such as, notably, the kidneys.

D. H.

DRACOUlidès (N.). Observations dermatologiques au cours de la dengue (pendant la pandémie d'Athènes, en 1928). [**The Dermatology of Dengue.**—*Bull. Soc. Française Dermat. et Syph.* 1929. June. No. 6. pp. 612-615. [2 refs.]]

In view of the large number of cases of dengue in Greece in 1928, the author describes the symptoms, complications and sequelae affecting the skin, which he met with in the course of his practice as dermatologist. Apart from the specific dengue eruption, the following were seen :—

1. *Purpura* :—Two cases ; both during convalescence, one in an old man of 73 ; this was a generalized purpuric eruption, without fever, but suggesting an infection purpura. Cured by administration of lime salts.

2. *Sudamina*.—Pinhead spots containing a crystalline fluid and appearing in successive crops ; no fever and no itching ; the attack lasted about 15 days and was followed by brawny desquamation. The most marked case was in a lad who suffered from abscesses following dengue.

3. *Pustular eruptions and infections of the skin*.—There were many such cases : these comprised boils, carbuncles, follicular pustular eruptions, etc.

The author is in agreement with KYRIASIDES, in the opinion that dengue produces a state of lowered resistance to infections.

Treatment.—Stock and autogenous vaccines were of little use, but Besredka's local vaccine treatment was used with success.

Alopecia was fairly common, especially among women after an attack of dengue ; lotions were useful, but the best results were obtained from application of ultra-violet rays.

D. H.

KOKORIS (D.). *Chirurgische Beobachtungen beim Denguefieber*. [*Surgical Observations in Dengue*.]—*Wien. Klin. Woch.* 1929. June 6. Vol. 42. No. 23. pp. 781-782.

The author discusses the surgical aspects of the dengue epidemic in Greece in 1928. He is of opinion that dengue predisposes to inflammation and pyogenic infections such as boils and carbuncles, many of which require surgical treatment. He noted that on occasions when subcutaneous injections were given, inflammation followed, although every antiseptic precaution was taken. Suppuration of the urinary tract was also noted, with occasionally acute retention of the urine. Cystitis occurred in women and the colon bacillus was isolated from the urine. Appendicitis and cholecystitis were found to be more frequent in dengue patients than in others ; such cases were not easy to diagnose. The author cites a case where a woman, aged 70, the subject of dengue, developed a purulent discharge from the vagina, and another case of a man who had a small neoplasm in the axilla, after dengue, which suddenly began to enlarge rapidly.

KONDOLEON (Emm.) & JOANNIDES (G.). *Die chirurgischen Komplikationen der Dengue*. [*Surgical Complications of Dengue*.]—*Muench. Med. Woch.* 1929. Feb. 1. Vol. 76. No. 5. pp. 197-198. [Greek Pasteur Inst., Athens.]

This paper, like those of KYRIASIDES (below), refers to the frequency of inflammatory and suppurative lesions following attacks of dengue. Ten cases of inflammation of the parotid gland were met with ; two healed without suppuration and two were bilateral. The prognosis in these cases, even when early incision was carried out, was grave. In 60 cases, in the clinic, there were many cases of carbuncle and staphylococcal abscesses. Inflammation of the fascia of the palms of the hands was seen ; also one or two cases of circumscribed peritonitis, which were operated on. One case of retention of urine was due to inflammation in the pelvic region. The author agrees with KYRIASIDES that there is distinct evidence, both in the local condition in the tissues and in the blood picture, that the virus of dengue causes marked diminution of protective power, and on this account he warns physicians against the use of hypodermic medication in dengue.

D. H.

KAIRIS (Z.). Ueber die chirurgisch-urologischen Komplikationen des Denguefiebers. [**Surgical Urological Complications in Dengue.**]—*Ztschr. f. Urol. Chirurg.* 1929. July 9. Vol. 27. No. 4-6. pp. 419-423. [1 ref.]

The author gives an account of the dengue epidemic in Athens in 1927, and points out that there were many variations from the normal type, and, indeed, the clinical picture was protean. Some authors have stated that albumin is not present as a rule in the urine of dengue fever patients, but this was not the experience of the author.

The purpose of the paper is to draw attention to some cases in the author's practice in which various urological complications occurred. In the majority such complications were reactivations of latent infections. Thus in three patients who had been previously operated on for vesico-vaginal fistula, and in whom the urine had cleared up, pus again appeared in the urine during the attack of dengue. In one case, a man of 45 years of age, pus appeared in his urine with symptoms of cystitis; on examination a previously unsuspected stone in the right kidney was discovered. Another case, that of a man who had been operated on for stone in the bladder some years previously, developed during his attack of dengue an acute cystitis, which soon cleared up under treatment. Although in most of his cases of pus in the urine, *Bact. coli* or staphylococcal infections were found, the suggestion is made that the virus of dengue may be capable of pus production apart from its effect in reducing bodily resistance.

A case of acute retention of urine was attributed to the influence of the virus on the nerve supply to the wall of the bladder.

D. H.

KYRIASIDIS (K. N.). Untersuchungen ueber die Aetiologie der infektiösen Prozesse bei Denguefieber. [**Etiology of the Inflammatory Complications of Dengue.**]—*Deut. Med. Woch.* 1929. Sept. 27. Vol. 55. No. 39. pp. 1634-1635. [6 refs.]

KYRIAZIDES (N.). Recherches de laboratoire sur l'étiologie des complications inflammatoires de la dengue.—*Presse Méd.* 1929. Sept. 21. Vol. 37. No. 76. pp. 1233-1235. [6 refs.]

The principal inflammatory complications noted in dengue cases were boils, carbuncles, inflamed glands (parotid and lymph), abscesses at the site of subcutaneous injections, septicaemia, acute appendicitis and reactivation of old sores.

Seven cases with complications were specially investigated and the results are displayed in tabular form: Three showed boils or carbuncles one going on to septicaemia and death. Two developed abscess at the site of an injection and both died, one from streptococcal, the other from staphylococcal infection. One developed a deep-seated inflammation in the palm of the hand; this was treated by autogenous vaccine and made a good recovery. One developed inflammation of the parotid gland and died. The author is of opinion that the virus of dengue renders the patient specially susceptible to inflammatory attacks owing to a reduction in protective power.

Blood counts of 80 cases are tabulated; there was reduction in the total number of red cells but not below 3,500,000; the haemoglobin varied from 60 to 90 per cent. The white cells were reduced in number and this reduction persisted for 20 days after the fever, counts as low

as 2,000 per cmm. being met with. This white cell loss was principally due to reduction in the polymorphonuclear cells; there was a relative lymphocytosis.

A bacteriological investigation of the seven cases showed that in five *Staphylococcus aureus* was responsible and in two the streptococcus; there were four deaths and three recoveries. The opsonic index tested in 33 cases was found to be below the normal for staphylococcus in 32.

D. H.

OEKONOMOPOULO (N.). Die Dengue-Fieber-Erkrankung in Beziehung zur Lungentuberkulose. [*Dengue and its Relation to Tubercle of the Lung.*].—*Acta Med. Scandinavica*. 1929. July 2. Vol. 71. No. 3/4. pp. 301–324. With 30 text figs.

This long paper is largely taken up with detailed descriptions of cases and their investigation by bacteriological, clinical and X-ray examinations; no fewer than thirty radiograms of the chest are reproduced. It is on the same lines as that by CHANIOTIS and SCORDOMBEKIS summarized in this *Bulletin* [Vol. 26, p. 836].

Category I of the present author (50 cases) includes people who had showed no symptoms of definite tuberculosis of the lung prior to the attack and who, during and for some months after the illness, were under his personal supervision.

Category II persons who some time after the attack of dengue attended for various ailments, such as increased expectoration, slight evening rise of temperature, difficulty in breathing, etc. These persons, 38 in number, attended for the first time and so far as they knew had never suffered from tuberculosis.

All these 88 cases were very carefully examined, and in none of Category I was any sign of tuberculosis found and in only two out of Category II. These two were considered to be the development of a latent tendency to tubercle which had been ignored by the persons themselves and overlooked by their medical attendants.

In certain cases X-rays showed some old lesions, but there was no evidence whatever of reactivation. The author therefore considers that one must be very guarded in attributing any phthisiogenetic influence in the strict sense to dengue, and if any such power really exists, it is in a very much smaller ratio than in influenza.

Part II deals with cases in which tubercle of the lung, in one form or another, was present. The cases here described were already in the tubercle clinic and under treatment and developed dengue while under observation. These cases are divided into:—

- | | | | | |
|----------------------------------|-----|-----|-----|-----------|
| A. Progressive form of tubercle | ... | ... | ... | 7 cases. |
| B. Stationary form of tubercle | ... | ... | ... | 7 cases. |
| C. Latent (inclined to) tubercle | ... | ... | ... | 11 cases. |

Part III deals with the influence of dengue on definitely latent and clinically cured cases. Nine are described in detail and the following summing up of the two last categories is given.

Dengue fever is of such short duration that even in its most severe form it exercises but a passing influence on the different organs; it is thus exceedingly unlikely that it could produce any lasting change.

On the other hand, the author considers, the haemorrhagic diathesis so noticeable in the dengue epidemic in Athens may have a considerable bearing on the lung condition; and if a tuberculous lesion is present—especially if it is in the early stage and in the exudative condition without any fibrotic change—an attack of dengue may have an unfavourable influence. If, however, the tuberculous process is chronic and the fibrotic stage has been reached dengue cannot and does not exert any influence whatsoever.

D. H.

BLANC (Georges) & CAMINOPETROS (J.). Contribution à l'étude de la vaccination contre la dengue. [**Vaccination against Dengue.**]—*Bull. Acad. Méd.* 1929. July 9. Year 93. 3rd Ser. Vol. 102. No. 26. pp. 37–40. [9 refs.] [Pasteur Inst., Athens.]

In view of the recent widespread epidemics of dengue it would be well to consider the possibility of anti-dengue vaccination. In September, 1928, the authors carried out an enquiry into this question: they considered (1) immunity following an attack, (2) immunity following injection of killed virus and serum of convalescents.

Opinions differ as to the occurrence of second attacks of dengue, but observers in Athens, including the authors, were of opinion that second attacks were very rare and that one attack conferred a very marked degree of immunity, which was of considerable duration. The question then was to obtain a corresponding degree of immunity by artificial means.

It was found that injection of virus killed by heat or by chemicals had no preventive action whatsoever, and people so inoculated invariably reacted to injection of the living virus. It was also found that neither the serum nor whole blood of convalescents had any action whatsoever on the virus either *in vitro* or *in vivo*; also a mixture of the virus with serum of convalescents was always infective.

Attempts were then made to obtain an attenuated living virus for purposes of inoculation and prevention; the suggestion being that such a virus might give rise to so-called 'inapparent dengue' with subsequent immunity.

The best results were obtained with a virus treated with 1/5 to 1/10 of its volume of bile. The bile was mixed with the infective blood and kept for 24 hours and it was then found that the blood was no longer infective; the time of contact was gradually reduced to five minutes, and the result was the same. But after one injection of bile vaccine, the volunteers were found still to be susceptible to an infecting dose of 2 cc. of serum. Nine people were then treated with four doses of bile-treated serum; three weeks later five were tested with an infective dose; two developed dengue and three were resistant.

Further experiments were then made with still less bile in the mixture, 1/20 of the volume, and it was found that if this proportion was left in contact for five minutes the virus was not killed, but was attenuated, whereas if it was left for 15 minutes, the virus was killed; also bile in the proportion of 1/15 killed the virus in five minutes.

It was found that volunteers inoculated with bile virus 1/15 were no longer susceptible to 1/20 bile-virus.

Twenty-two persons were thus doubly inoculated, first with 1/15 bile-virus, and later with 1/20 bile-virus; these people were then tested three weeks later with known infective doses, and only two reacted.

D. H.

BLANC (Georges) & CAMINOPETROS (J.). Quelques données expérimentales sur le virus de la dengue. [**Some Experimental Data on Virus of Dengue.**]—*C.R. Acad. Sci.* 1929. Oct. 14. Vol. 189. No. 16. pp. 594–596. [5 refs.]

It has been shown that the serum of individuals convalescent from yellow fever protects against the virus of that disease. In view of the similarity between this disease and dengue the authors carried out the following researches.

- They obtained a potent yellow fever anti-serum and injected a dose into one flank of a volunteer and a dose of dengue virus at the same time into the other flank; the volunteer after the usual incubation period developed an attack of dengue. The same result followed when the serum and virus were mixed, kept in contact for some hours and then injected into a volunteer. A yellow fever serum has therefore no action on the virus of dengue.

It has also been shown that the virus of yellow fever in the blood of patients is readily filterable, whereas the virus in the mosquito is only filterable with great difficulty; not so with dengue; the virus in the mosquito is just as easily passed through a filter as is the virus from the blood of cases of the disease.

The yellow fever virus can only be recovered from the blood up to the 3rd day (very occasionally on the 4th), whereas the authors find that the virus of dengue can be recovered from the blood as long as the fever lasts.

D. H.

KLIGLER (I. J.). **Studies on the Etiology of Phlebotomus and Dengue Fever. III. The Transmission of Dengue Fever to Monkeys.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 193-196. [3 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

During the 1927 epidemic of dengue in Palestine the author inoculated *Cercopithecus* monkeys with the blood of patients taken during the first or second day of the fever, and noted certain changes in the blood picture of the monkeys which suggested an infection. He injected 1.5 cc. of infective blood into the arm of the monkey, and although there was no outward change and no fever, yet about the sixth day there was a marked change in the relative blood count and a decrease in the total count. This change was principally a decrease in the polynuclear cells and an increase in the lymphocytes and large mono-nuclear cells; by the eleventh and twelfth day the count had returned to normal.

The author agrees that this observation is suggestive only and requires further confirmation, which has, in part, been supplied by BLANC who has shown that the blood of *Cercopithecus* monkeys is infective from the fifth to the tenth day after inoculation with dengue virus. Other species of monkey when inoculated with blood from dengue cases showed no change in the blood picture.

D. H.

RAEVSKY (A. S.). [**Pappataci Fever in Turkmenistan.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 2. pp 176-180. With 4 graphs in text. [In Russian. English summary p. 227.]

An outbreak of pappataci fever in Turkmenistan (formerly Trans-Caspian region) occurred in the summer of 1928 in the village of Hadja, a railway station of the Middle Asiatic Railway.

The locality abounds in *Phlebotomus* and two species, *P. pappataci* and *P. minutus*, were identified.

D. H.

KANDELAKI (S.) [**Dengue.**].—*Nachrichten d. Tropischen Medizin.* Tiflis. 1929. Feb. Vol. 2. No. 2. [In Georgian script. German summary p. 177.]

The author discusses the diagnosis and etiology of the disease which appeared in Georgia following on the epidemic of dengue in Greece. He had experience of the same disease during the Great War in 1916-1917. He identifies the summer fever of Trebizond as sand fly fever, and the vector is present there. But in Batum and other ports of Georgia, where *Aedes* is met with, dengue is also common.

D. H.

GASPERINI (Carlo Gasperino). Considerazioni epidemiologiche sulla dengue nelle isole Sporadi Meridionali (estate-autunno 1928).—*Arch. Ital. Sci. Med. Colon.* 1929. Aug. 1. Vol. 10. No. 8. pp. 379-388. English summary p. 388.

MEDULLA (Candido). L'epidemia di dengue in Cirenaica.—19 pp. [24 refs.] 1928. Bengasi. [Cirenaica: Ospedale Coloniale di Bengasi.]

NERI (Filippo). Sulla epidemia di dengue in Grecia nel 1928. Note epidemiologiche.—*Ann. d'Igiene* 1929. Feb. Vol. 39. No. 2. pp. 93-101. [Inst. of Hyg. & Bact., Univ., Bari, Italy.]

UNCLASSED FEVERS.

MACARTHUR (W. P.), DUDLEY (S. F.) & WHITTINGHAM (H. E.). **Tropical Fevers of Short Duration.**—*Jl. Roy. Army Med. Corps.* 1929. Oct. Vol. 53. No. 4. pp. 247-249.

This paper was the opening one of the discussion on "Tropical fevers of short duration" at the Fifth International Congress of Military Medicine and Pharmacy held in London in May, 1929. The following is a summary:—

"Diseases may be indefinite, because they are atypical examples of well-known infections, or because they are separate clinical entities that still await full description. The first class includes mild or abortive cases of such conditions as typhoid, paratyphoid and undulant fever. Malaria frequently shows a low continued fever, the paroxysms being absent and the parasites so scanty in the blood as to be easily overlooked. Abortive heat stroke may also account for some ill-defined febrile attacks, in children, and after heavy exercise, in hot climates. Dengue and phlebotomus fever are recognized as definite clinical entities, but owing to their lack of definite symptoms are frequently confused with similar syndromes. Especially is this the case with influenza, which is very common in the tropics, but rarely accompanied by nasal catarrh. The blood pictures of dengue and sand fly fever are often not sufficiently distinct from that of influenza to separate, with any certainty, these diseases. Recently spirochaetosis as a cause of short fever has attracted attention. The leptospira as a group show many variants, which although indistinguishable morphologically, yet seem able to cause clinical symptoms which vary from a day or two of pyrexia accompanied by injected conjunctiva, and a trace of albumen in the urine, up to a severe toxæmic jaundice. Weil's disease has probably at times been recorded as dengue. The more severe forms of dengue and sand fly fever should, however, be distinguished from spirochaetosis by their respective blood pictures. Weil's disease, in its turn, can generally be distinguished from yellow fever by the relative quantities of albumen in the urine. If a urine boils solid, the diagnosis is yellow fever; if there is only a trace of albumen, Weil's disease. The attempts which are being made to distinguish and describe indefinite short fevers are handicapped, and the

confusion increased, by the habit which exists in some quarters of labelling cases, in which the diagnosis is really unknown, with a definite name, for the sake of hospital records. If a case, in spite of all possible investigation, remains a "pyrexia of unknown origin" it must be honestly left as such in all sick returns."

D. Harvey.

WOLFF (J. W.). "Tropical Typhus," een vlektyphusachtige ziekte. [**Tropical Typhus, a Typhus-like Disease.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. May 10. Vol. 69. No. 5. pp. 429-458. With 19 charts. [55 refs.] English summary pp. 458-460. [Path. Lab., Medan.]

Since 1922 agglutinations with different strains of *Proteus X19* have been carried out as a routine in the Medan laboratory on all sera sent in for Widal tests. Out of approximately 6,000 tests a positive reaction at and above 1/250 was found 52 times. A critical examination of these cases showed that in 29 there was evidence to justify the diagnosis of tropical typhus. Short notes of these 29 cases are given.

The author does not propose to identify tropical typhus with typhus fever since enough is not known about the epidemiology of the disease to justify such identification. Further research may show that the two are caused by organisms of the same group but are carried by different vectors.

He reviews the literature of tropical typhus, its occurrence in different regions, and the specificity of the Weil-Felix reaction, one of the main factors on which diagnosis is based.

It is shown that a positive agglutination of *Proteus X19* bacilli by sera may take place under the following circumstances:—

(1) During an attack of food poisoning, due to infection with *Proteus vulgaris*.

(2) During the course of typhus fever including tropical typhus.

(3) As a para-agglutination in the course of another disease, e.g., typhoid.

Differential points are: (i) That the agglutinins in Class I are thermostable, whereas in Classes II and III they are thermolabile. (ii) The type of strain used; some cases of tropical typhus agglutinate indol-forming strains of *Proteus*, others the non-indol formers. (iii) In Classes I and II the titre rises during the course of the illness but not in Class III.

D. H.

VAN STEENIS (P. B.). Het vraagstuk van de febris exanthematica in de tropen; Brill's Disease (Brill), Kumaon koorts of Tick Typhus (Megaw) Tropical Typhus (Fletcher). [**The Question of Typhus and Like Fevers in the Tropics.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. June 10. Vol. 69. No. 6. pp. 572-589. With 5 charts on 1 folding plate. [7 refs.]

The author gives an account of 5 cases of "tropical typhus" in soldiers at Weltevreden (Java), all corresponding to FLETCHER's original description (see this *Bulletin*, Vol. 24, pp. 122-123). The Weil-Felix reaction was positive in high dilution. It is probable that the disease is endemic in Java, especially in the mountainous parts of the Preanger districts, where the patients apparently acquired the infection during military manoeuvres.

The author urges the application of the Weil-Felix reaction in all cases of non-classed fevers, especially in natives, to obtain information about the distribution of the disease.

W. J. Bais.

OLMER (D.) & OLMER (Jean). La fièvre exanthématique. [**Exanthematous Fever.**].—*Rev. d'Hyg. et de Méd. Préventive*. 1929. July. Vol. 51. No. 7. pp. 473-482. With 3 coloured plates. [3 refs.] Also in *Rev. Prat. Malad. des Pays Chauds*. 1928. Aug. Year 7. Vol. 8. No. 8. pp. 403-404, 407-411. [1 ref.]

The authors give a complete study of the exanthematous fever first described by one of them in Marseilles in 1925. The clinical characters are first described under three headings: (1) The clinical course; (2) the eschar of inoculation (*tache noire*); (3) the rash.

The *clinical course* is divided into two periods, the pre-eruptive and the eruptive. There is nothing new in the description of these stages, but it is definitely stated that relapses or recrudescences have never been noted.

The eschar.—Although not noted in every case this small "primary sore" is very frequent and can usually be found if carefully looked for; it has already been fully described by these authors and others. The enlargement of lymph glands draining the area is also noted. The sore persists for eighteen days and then disappears leaving a superficial ulceration, slightly indurated and surrounded by a reddish halo, and finally healing up some days later. [It would appear that in the class of persons among whom these cases occur evidence of insect bites in the summer season in Marseilles must be very common if carefully looked for, even in persons not suffering from fever.]

A careful description of the maculo-papular rash is given, and also of its distribution which includes the face, the palms and the soles.

Experimental work.—So far no causal germ has been isolated; but injections of the blood of cases of fever (taken about the eighth day) into the peritoneum of monkeys has given rise, after an incubation period of seven to nine days, to a definite fever which can be passed on from monkey to monkey in series. On the other hand, all attempts to produce a reaction in guineapigs have failed. An interesting point is that the monkeys which have suffered from the fever produced by the virus of the Marseilles disease react subsequently to the virus of typhus fever and vice versa. The authors state that the Weil-Felix reaction is positive in these cases up to a dilution of 1/1,000. [This is contrary to the experience and opinion of other workers.] They agree, however, that this agglutination of *Proteus X19* is slow in appearing (not till at the end of the period of fever) and is inconstant and difficult to detect.

Epidemiology.—The disease in Marseilles and its suburbs occurs in the summer, beginning in May or June, reaching a maximum in August and disappearing in October. It is not contagious from man to man. Very careful examination of the patients has failed to detect the presence of lice; the authors consider that they may be excluded from the rôle of vector and they suggest that the tick, *Ixodes ricinus*, may be the vector and the dog the carrier of the disease.

The place of exanthematous fever in the nosology.—The authors are of opinion that this disease can be clearly differentiated by its clinical, experimental and epidemiological characters from other known diseases.

There follows a discussion of the differential diagnosis between dengue, typhus and Marseilles fever. As regards dengue, the points are that in Marseilles fever the onset is not so sudden or abrupt, the pains are less violent, the rash is quite different and the temperature curve is distinct; also the agent of dengue, *Aedes*, is rare in Marseilles. The Marseilles fever can be distinguished from typhus by the absence of the typhoid state, the presence of the rash on the face and the *tache noire*; but the authors attach most importance to the experimental test which has already been noted. On the other hand, they consider that the disease under discussion is clearly allied if not identical with the "fièvre boutonneuse" of Tunis, and is also similar to Rocky Mountain fever and Japanese river fever.

D. H.

MEDULLA (Candido). Sopra alcuni casi di febbri eruttive similari al dermatifo osservati in Tobruch (Cirenaica). (Contributo alla diagnosi del tifo petecchiale). [**Cases of Fever with Petechial Exanthem in Cyrenaica.**].—21 pp. [11 refs.] 1928. Bengasi : [Cirenaica : Ospedale Coloniale di Tobruch.]

Nine cases are recorded, occurring in 1922–26, the symptoms being headache, fever to 39.3° C., and a petechial rash. The temperature fell by crisis in 7–10 days. The Weil-Felix reaction was negative in every case, two gave a positive agglutination with *Bact. typhosum*, one with *Bact. paratyphosum A*, and three with *Bact. paratyphosum B*, but none in high dilution. [No mention is made whether the subjects had received antityphoid inoculation.]

H. Harold Scott.

ROUSLACROIX & RECORDIER. Maladie d'Olmer à forme délirante. [**Olmer's Disease with Delirium.**].—*Marseille-Méd.* 1929. June 25. Vol. 66. No. 18. pp. 884–886.

This short paper describes a severe case of Marseilles fever in which a prominent symptom was delirium of the confusion type, with complete loss of memory. The patient made a good recovery, the delirium passing off little by little with the fever, which lasted in all 14 days. An interesting point is that a "tache noire," or primary ulcer, was found on the side of the neck. On enquiry it was found that a few days before the fever commenced the patient was bitten on this spot by a tick which he removed himself: he kept three dogs which were tick infested. The Weil-Felix reaction was completely negative.

D. H.

LONGO (Domenico). Un caso di tifo esantematico endemico benigno (malattia di Brill). [**A Case of Brill's Disease.**].—*Riforma Med.* 1929. July 29. Vol. 45. No. 26. pp. 889–890. With 3 text figs. [8 refs.] [Colonial Hosp., Tripoli.]

The patient a soldier, 20 years of age, came to hospital in Tripoli, having been ill for two days with general pains and anorexia. On the fifth day a macular rash appeared, most marked on the extremities and becoming

petechial. The temperature fell by rapid lysis on the tenth and eleventh days, but the rash did not fade for another week. The Weil-Felix reaction was positive up to 1 : 500.

H. Harold Scott.

COGLIEVINA (Benvenuto). Funzionalità epatica e disturbi psichici nella febbre petecchiale.—*Giorn. di Clin. Med.* 1929. June 30. Vol. 10. No. 9. pp. 543-546, 549-552, 555-558, 561-563.

CARRION'S DISEASE.

ESCOMEL (Edmundo). La maladie de Carrion ou Verruga du Pérou. [**Carrion's Disease or Verruga Peruana.**]*—Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 348-362. [69 refs.]

This is a résumé of work done on this disease by the author and others since 1901. During this period he has had personal experience in Peru.

The name, Carrion's disease, was given in honour of the Peruvian scientist of that name who inoculated himself with the juice from a verrugous tumour and died of an acute fever with anaemia without eruption, thus demonstrating many years ago the unity of the two diseases, then called Verruga peruviana and Oroya fever. The latter name is a misnomer, as the fever does not occur in the district of Oroya, but occurred frequently among the navvies employed in building the railway to that city. The disease is actually met with only in the valleys of Central Peru at an elevation of 1,800 to 9,000 feet.

The author then describes the symptomatology of the disease which he divides into two periods, the pre-eruptive and the eruptive stages. The first is that condition previously and erroneously called Oroya fever and is characterized by fever, weakness, intense anaemia and pains in the joints; at this time there is a marked leucocytosis and numerous *Bart. bacilliformis* are found in the red cells. This period lasts about two weeks and may either end fatally, as it frequently does, or pass on into the eruptive stage. In the verruga stage, small pimples appear, these are at first intradermal, but later become nodular and, later still, resemble chilblains and may break through the skin, ulcerate and coalesce, destroying large areas of the skin. The eruption then gradually disappears and convalescence begins.

Microscopically the Bartonella are found in the endothelial cells of the verrugous tumours. These bodies were first described in 1905 by Professor BARTON of Peru, and named by STRONG *bacilliformis*. As the bacillary form is not the only one, the author suggests the name Bartonella peruviana to cover all the forms found in the disease. A brief description of the parasite and the situations in which it is found is then given. The author is of opinion that this body is the sole and only cause of Carrion's disease.

Reference is made to the successful cultural experiments of NOGUCHI and his co-workers and also the successful inoculation of monkeys by the same author, work which has again confirmed the unity of the fever stage and the eruptive stage.

The diagnosis and prognosis of the disease are then discussed and it is pointed out that the latter is always grave in the first or fever stage.

Unfortunately, so far, there is no drug which exerts any specific action on the malady.

D. Harvey.

NOGUCHI (Hideyo), MULLER (Henry R.), TILDEN (Evelyn B.) & TYLER (Joseph R.). **Etiology of Oroya Fever. XV. Effect of Immune Serum on the Course of Bartonella bacilliformis Infection in Macacus rhesus.**—*Jl. Experim. Med.* 1929. Sept. 1. Vol. 50. No. 3. pp. 355–364. With 12 figs. on 2 plates. [1 ref.]

The experiments recorded in this paper, in tabular form, were carried out to test the inhibitory power on Bartonella of large doses (20 cc.) of serum taken from patients convalescent from Oroya fever. The serum was given 24 hours before the intradermal and intravenous injection into monkeys of a highly virulent strain of Bartonella which had been isolated from Phlebotomi. A control animal developed severe skin lesions within two weeks and its blood yielded cultures of Bartonella bacilliformis in a dilution of 1/10,000 after ten days; the treated animals remained free from lesions for 25 days and cultures of the blood were sterile. However, in two of these animals, typical nodules developed after 25 days at the site of the intradermal inoculation, showing that the parasites had not been killed but had been inhibited until the period of passive immunity conferred by the serum had passed off. This conclusion was verified by further experiments. When the convalescent serum was given after the appearance of the nodules it had no effect on these, but the parasite disappeared from the blood. It is suggested that convalescent serum might, with advantage, be employed in the treatment of the disease in man.

D. H.

NOGUCHI (Hideyo), MULLER (Henry R.), TILDEN (Evelyn B.) & TYLER (Joseph R.). **Etiology of Oroya Fever. XVI. Verruga in the Dog and the Donkey.**—*Jl. Experim. Med.* 1929. Oct. 1. Vol. 50. No. 4. pp. 455–461. With 8 figs. on 3 plates. [11 refs.] [Rockefeller Inst. for Med. Research, New York.]

In an attempt to find susceptible animals for experimental research with Bartonella, Noguchi and BATTISTINI tried various species of monkeys, as well as dogs, rabbits, rats, mice and guineapigs. Only the Rhesus monkey gave definite results. Later, experiments were started with horses, dogs and donkeys, but only in one donkey and in a dog was any definite result obtained, and the presence of Bartonella bacilliformis demonstrated by culture and by passage to Rhesus monkeys. The reaction produced in these animals was entirely local; blood cultures were invariably negative.

D. H.

DA CUNHA (Aristides Márquez). Verruga del Perú. [**Verruga peruviana.**]—*Prensa Méd. Argentina.* 1929. June 30. Vol. 16. No. 3. pp. 166–175. With 12 text figs. [Oswaldo Cruz Inst., Rio de Janeiro.]

A good general description of Carrion's disease and the experimental work in connexion with inoculation of cultures of Bartonella bacilliformis in monkeys to demonstrate that Oroya fever and Verruga are manifestations of the same disease. Microphotographs of the blood-pictures and of the tissue changes are given. The condition described by BASSEWITZ as occurring in Rio Grande del Sul and named by him *Angiofibroma cutis circumscriptum contagiosum* bears many resemblances to verruga, but runs a mild, afebrile course; this should be investigated further with a view to determining whether it also is a manifestation.

H. Harold Scott.

MISCELLANEOUS.

THORNTON (C. V.). **Treatment of Non-Specific Diarrhoea in the Tropics.**
—*Brit. Med. Jl.* 1928. Nov. 10. pp. 843-844.

The author, in Bombay, refers to the frequency of non-specific diarrhoea in the tropics and the difficulty of successful treatment. He classes the causes of tropical diarrhoea as: (1) the dysenteries; (2) sprue; (3) tubercle or syphilis; (4) others; mentioning also food poisoning and cholera. The causes under headings (1) (2) and (3) are readily eliminated. In (4) there is no pain, nor change in the colour of the liquid motions, but ingestion of food causes prompt evacuation. He refers to recent work of H. SCOTT, which tends to show that in sprue some substance produced by the liver and probably a hormone is diminished in quantity. Absence of this hormone means non-digestion of food and hurrying on of bowel contents. Acting on this hypothesis the author avoids purgatives, puts the patient to bed for three days on citrated milk in small and frequent quantities and administers liver in powdered form, or as soup. Calcium lactate may also be given. The success, he says, is most striking.

A. G. B.

HERMITTE (L. C. D.). **Treatment of Non-Specific Diarrhoea in the Tropics.** [Correspondence.]—*Brit. Med. Jl.* 1929. Feb. 2. pp. 220-221.

Referring to THORNTON's article (above) the author writes that after 5 years' experience in Assam and 2 in the Seychelles he believes there are few cases of diarrhoea in the tropics to which a definite cause cannot be assigned. In Assam the condition which gave most concern was "choleraic diarrhoea," a very acute gastro-enteritis which was not cholera. This could be classified in 5 main groups—acute bacillary dysentery, algid subtertian malaria, mushroom poisoning, food poisoning, cause unknown. He suggests that THORNTON has overlooked diarrhoeas caused by intestinal protozoa (other than *E. histolytica*) and helminths and lists *Balantidium coli*, *Entamoeba coli*, *Giardia intestinalis*, *Trichomonas hominis*, *Chilomastix mesnili*, *Blastocystis hominis*, *Strongyloides stercoralis* and even ascaris, ancylostomes and Trichiuris. [Curiously he does not mention spirochaetes.] For protozoal parasites he has found stovarsol a specific. He has had 35 cases of balantidiasis under his care in Seychelles, all cured by stovarsol. He thinks the opportunities for liver therapy are restricted.

A. G. B.

MORGAN (W. Bonner). **Burning Feet.**—*Malayan Med. Jl.* 1929. June. Vol. 4. No. 2. pp. 69-70.

This is a disease with which all engaged in estate practice in Malaya are familiar. The symptoms are described. The subjects are Tamil emigrants who are thin and weak, and complain of mental depression and insomnia. More than half showed "small black cutaneous nodules over the external surfaces of the legs and forearms which disappeared

under treatment." All had left India about a year, and were recruited from districts in S.W. Madras with a rainfall too low for cultivation of rice; it is probably the shortage of cereals which occasions their departure. Nineteen severe cases were treated in hospital with nitroglycerine internally and injected into the legs. The diet was No. 1 hospital diet with Indian corn, ragi and additional eggs and mutton: cow's milk was not available. Pain was less in a week and practically gone in a fortnight. On their discharge they were told to eat Indian corn and ragi. Seventeen of the patients were weeders and 13 females. It is noted that weeders get less pay than tappers and presumably poorer food, and that though Telegus were working on these estates none of this race was among the patients. Telegus feed better than Tamils. An enquiry 4 months later showed that 12 were at work, and 6 had disappeared or gone to India. The administration of nitroglycerine was suggested by the idea that there was over-stimulation of the sympathetic nerves, due to deficiency of vitamin B group.

A. G. B.

LABERNADIE (V. G. F.). A propos d'un cas de "Burning of the Feet."
[A Case of Burning of the Feet.]—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 13-15.
 [4 refs.]

Major Labernadie of the Pondicherry Laboratory refers to MALCOLMSON's account of this disease [see this *Bulletin*, Vol. 26, p. 423]. It appears that burning of the feet was known in Europe before MALCOLMSON. In 1762 it was recorded from Savigliano in Piedmont and in 1806 among troops in Padua; it was called pedionalgia, or chiropodalgia if the hands were also attacked. [The affection of the hands suggests that the condition may not be the same as in the Eastern Tropics.] The same symptom, or symptoms, was reported elsewhere in Europe, and later was named acrodynia. [Here again the upper extremity suffers as well as the lower.]

In 1861 COLLAS described 3 cases of "Burning of the Feet" from Pondicherry (*Ann. Hyg. Med. Col.*, 1911, Vol. 14, p. 828). The author here describes a case in a woman, of syphilitic origin and cured by antisypilitic treatment. He considers the condition to be a polyneuritic syndrome of varied etiology.

A. G. B.

ROEGHOLT (M. N.). Bijdrage tot de chirurgie van de lever en de galblaas in Indië. [**Surgery of Liver and Gall-Bladder in the Dutch East Indies.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. Feb. 16. 72nd Year. 1st Half. No. 7. pp. 826-834.

Roegholt gives an account of his surgical experience during four years at Semarang (Java).

1. Clinically manifest *cholelithiasis* is rare in Java, though stones were found in the biliary passages in 5 per cent. of 180 post-mortems at Semarang [probably less frequently in other parts of Java]. In the author's three clinical cases operation was refused.

2. *Cholecystitis* was rarely seen, but the author believes that only a small part of these cases come under medical observation. Gastro-intestinal disturbances are prevalent enough in the natives to account for some frequency of ascending infections of the bile passages.

3. In cases of *cirrhosis of the liver* Roegholt once extirpated the spleen in a case complicated with jaundice, with apparent beneficial influence on the latter symptom. In a few cases he performed RUOTTE's operation, i.e., the implantation of the vena saphena in the peritoneum. In some of these cases the success was obvious, in others the vein was obliterated after some time. The technic requires the utmost subtlety. Failure on one side, however, leaves the possibility open to try the operation on the other side.

4. *Syphilis of the liver* is mentioned with the warning to be reluctant to administer arsphenamin in this disease; the drug is apt to cause atrophy of the liver and subsequent death of the patient.

5. *Amoebic liver* is most interesting as regards its pathogenesis.

The preponderance of the right lobe as the site of liver abscess is not yet sufficiently explained. In case of haematogenous infection of the liver, SEREGE's theory of the separated blood currents from different parts of the gut in the large portal vein could account for the facts. A purely anatomical explanation, however, may be found in the theory of the lymphogenic spread of the amoebae, either from caecum, via superior mesenteric lymph vessels, the efferent vessels of the subpyloric chain and the hepatic chain to the liver (POIRIER), or from caecum, via superior mesenteric glands, pre-aortic glands, the coeliac group of these and the hepatic glands to the liver. The greater prevalence of liver abscess in the male is probably simply caused by the higher frequency of amoebic dysentery in men. The author is not convinced of the greater disposition of Europeans and Chinese to liver abscess in comparison with the Malay. Many cases in natives may escape attention. As regards treatment he prefers the open surgical treatment of the abscess.

6. *Wounds of the liver* were always fatal if the liver was actually torn. A gunshot wound without complication healed quickly; two others with complications died.

7. *Primary cancer of the liver* was fairly common.

8. One case of *ascariasis of the liver* is mentioned, in which the patient died from sepsis.

W. J. Bais.

LIPSCOMB (F. M.). **A Case of Cirrhosis of the Liver.**—*Jl. Roy. Army Med. Corps.* 1928. Dec. Vol. 51. No. 6. pp. 458-460. [5 refs.]

A European soldier, aet. 25, with 6 years' service in India. From March 1925 onwards, 6 admissions to hospital for undiagnosed short pyrexial attacks. August 1925, syphilis; treatment completed in March 1926. September 1927, began to lose weight. November, a rigor, backache, and palpable spleen; malarial parasites not found. December, abdomen noted swollen. Admitted to hospital December 10th with free fluid in abdomen, oedema of feet and bases of lungs, blood picture normal. December 11th, abdomen tapped; no viscus could be felt. Irregular pyrexia with at one time tertian periodicity; exhaustive blood examination showed no evidence of malaria. Wassermann negative. Two attacks of colic on right side abdomen. Death in coma after 4 tapplings, February 1928.

Autopsy showed an atrophic hobnail liver, weight 36 oz.; microscopically, atrophic multilobular cirrhosis with extensive fatty degeneration. Caecum thickened and oedematous, mucous membrane healthy. Marked infiltration of submucosa and muscular layers with small round cells; between these two layers, aggregations of polymorphs, almost amounting to small abscesses. Spleen moderately enlarged with general congestion; no malaria parasites.

The author thinks that the disease began with the undiagnosed infection in 1925, that the condition of the caecum and history of colic point to a chronic infection in the area drained by the portal vein, and that neither alcohol nor malaria was a cause. "It is instructive to note how easily the early symptoms of cirrhosis of the liver may be mistaken for 'clinical malaria.'" Reference is made to a paper by HUGHES & SHRIVASTAVA (see this *Bulletin*, Vol. 25, p. 395).

A. G. B.

UHLENDORF (Elsa). Ueber Appendicitis in exotischen Ländern. [**Appendicitis in Exotic Countries.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Feb. Vol. 33. No. 2. pp. 105-124. [3 pages of refs.] [*Trop. Inst., Tübingen.*]

Aside from Europe and North America, where appendicitis is a common disease, there is much difference of opinion about the frequency or rarity of this condition. Those who consider it to be rare seem the more numerous. The author makes a regional survey of the literature, considering in turn China, India, the Indian Archipelago, the South Sea, Asia Minor, Africa, Central and South America. Only in Africa and the interior of Asia Minor does the rarity of appendicitis seem to be generally recognized. From China there is most information: 176 authors are for rarity, and 14 for frequency. The author discusses China at some length and gives many reasons why the conclusions of the former are to be mistrusted. Many give no details of the duration of their stay in the district. The Chinese are reluctant to consult the "foreign devil doctor," and if they do so it is usually for a visible disease. They have a dread of abdominal palpation, because it is often a preliminary to operation. They have small fear of death, but much fear of pain, which the native doctor will relieve with opium. If a Chinese is brought to consider operation he must consult his family and select a favourable day, so that the opportunity may pass. Should he reach the hospital, light diet may cause him to take flight. In the author's opinion the rarity of appendicitis is only to be gauged in comparison with the figures for other abdominal conditions. On the whole she is inclined to range herself with those who believe that appendicitis is common in China. She discusses the records from other countries and reaches the obvious conclusion that, while cases of appendicitis have been described from all countries, until critical evaluation of exact hospital statistics is possible statements about frequency or rarity are vain.

A. G. B.

SITSEN (A. E.). Ueber Appendizitis auf Java. (Zugleich ein Beitrag zur Lehre von der Ätiologie der Wurmfortsatzentzündung.) [**Appendicitis in Java. Its Etiology.**]—*Wien. Med. Woch.* 1928. Nov. 10, Vol. 78. No. 46. pp. 1453-1454, 1457-1458. [4 refs.] [*Dutch Indies Med. School, Soerabaja, Java.*]

Java is suitable for the study of the etiology of appendicitis, for there is a big native (Malay) population (33 millions) and a large number of Europeans, including half-castes, some 130,000. Unfortunately the author offers no statistics. It is believed that the disease is rare

among the Malays, and such figures as he can give tend to bear this out. Possible causes are discussed, with the conclusion that appendicitis is in some way attributable to a meat diet.

A. G. B.

GUERIN & MATTLET. Quelques observations qui permettent d'affirmer l'existence du bacille diphtérique dans le Ruanda-Urundi. [**The Presence of the Diphtheria Bacillus in Ruanda-Urundi.**—*Ann. Soc. Belge de Méd. Trop.* 1929. Mar. 31. Vol. 9. No. 1. pp. 31–35.]

In the course of seven years with a daily average of 80 new cases six cases have been seen in which diphtheria was diagnosed. Four of the cases were severe conjunctivitis, one-sided in two instances. A pure culture of a bacillus indistinguishable from the diphtheria bacillus was obtained and cure resulted from injection of the "antidiphtheria vaccine" of the Institut Pasteur, Paris. In the fifth case there was paralysis of the lower limbs and lumbar muscles, so that the patient could not sit, and paralysis of muscles of pharynx and larynx with return of fluids through the nose. A severe sore throat with fever six months before had been followed a fortnight later by loss of voice and difficulty in swallowing. After 14 days of treatment with serum and strychnine the patient left hospital and walked 16 kilometres home. The morphology and cultural characters of the bacillus isolated from 5 of the cases are given. An inoculated rabbit was ill, but recovered.

A. G. B.

RAMBO (V. C.). **Diphtheria an Ever-Present Danger in India: a Report on a Series of Cases in Bilaspur District, Central Provinces, India.**—*Indian Med. Gaz.* 1928. Oct. Vol. 63. No. 10. pp. 575–578.

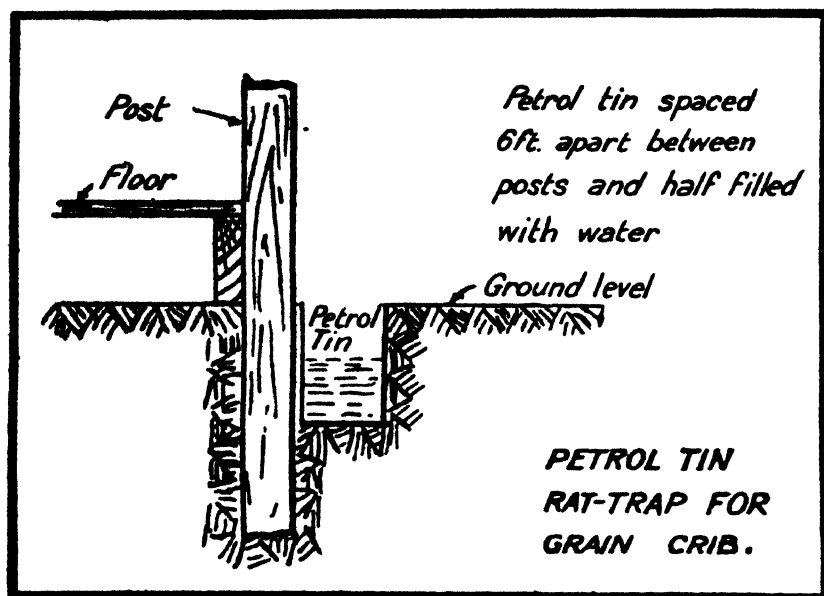
On his arrival in India the author was told, on the one hand, that diphtheria is exceedingly uncommon in that country and, on the other, that 4 boys of the Mission to which he was attached had died, 2 from undoubted and 2 from probable diphtheria. He here describes a series of 11 cases which occurred between November and March, all authenticated by a trained observer and many by smears. Of the 11, 8 were in children (6 European, 2 Indian). Antitoxin was used in all cases; there were 3 deaths. The author concludes that diphtheria should be thought of and looked for in all cases of colds and sore throats and antitoxin given immediately if there is any doubt; atypical cases are the rule. Diphtheria antitoxin should be kept in all dispensaries and stations. The susceptibility of Indians to diphtheria should be further studied.

A. G. B.

MARTIN (K. A. T.). **A Simple Method of Rat Destruction.**—*Kenya & East African Med. Jl.* 1928. Apr. Vol. 5. No. 1. pp. 16–17. With 1 text fig.

The method of rat catching described has been used with success on East African farms. The material required consists of empty 4-gallon gasoline cans.

"The top is taken off the tin, which is then sunk in the ground so that the open top is flush with the ground level; the tin is then half filled with water. A rat, which falls in, or overbalances in an attempt to get the water, is unable to get out, and quickly drowns."



[Reproduced from the *Kenya and East African Medical Journal*.]

"It is also important to change the water in the tins every day if possible. A little ingenuity will camouflage the tops."

J. F. C. H.

HEALTH. Melbourne. 1927. Jan. Vol. 5. No. 1. pp. 24-25.
Aspects of Mosquito Control Operations.

"In the *Proceedings of the Royal Society of Queensland*, Vol. xxxviii, No. 6, September, 1926, there appears a paper on 'Effects on Mosquito Larvae of a Queensland *Nitella*,' by Mr. E. W. I. Buhot, an inspector of the Queensland Department of Public Health. Mr. Buhot notes the previous work of Cabellero, of Spain (1919), Blow, of Madagascar (1924), and the negative findings of McGregor (1924) in connexion with the effects of various species of *Characeae* on mosquito larvae. The results are given of experiments carried out at Brisbane with a fresh-water plant obtained locally from various creeks, and provisionally named *Nitella phauloteles* by Groves. This plant grows prolifically beneath the surface in either running or stagnant water, reproduces freely, and is easily transplanted. Grown in an aquarium, it caused a green surface scum and a thin oil-like film on the water. In the aquarium in which this *Nitella* was growing, larvae of *Culex quinquefasciatus* (*C. fatigans*) were killed. When mosquitoes were kept in cages over this aquarium, no eggs were laid on the water by *Aedes argenteus* (*Stegomyia fasciata*), *Culex quinquefasciatus* or *Anopheles nyssorhynchus*. Female mosquitoes were continually found dead on the surface of the water. In control aquaria, without *Nitella*, but with other water plants, over which these mosquitoes were similarly caged, eggs were freely laid on the water.

"Whatever properties are imparted to the water by this *Nitella*, the water is not poisonous to animals or man. Rats given only this water to drink were not affected, and after being killed, showed healthy internal organs on examination. Fish and water slugs thrived in the water. Two glasses of water were drunk daily by Mr. Buhot from the aquarium over a period of two months. Mr. Buhot's conclusions are that the introduction of this plant should prove of great utility in eliminating mosquito breeding from ornamental ponds and from swamps and lagoons." [See this *Bulletin*, Vol. 25, p. 806, Vol. 26, p. 246.]

J. F. C. H.

WICKERSHAM (William W.). **Edema Disease among Haitian Prisoners. The Factors probably Responsible for its Disappearance.**—*U.S. Nav. Med. Bull.* 1929. Jan. Vol. 27. No. 1. pp. 69-73. [4 refs.] [Summary appears also in *Bulletin of Hygiene*.]

Previous to 1920 a disease characterized by oedema was very prevalent among the inmates of the prisons of Haiti and caused a high mortality rate. As a result of hygienic and dietetic reforms this disease has now practically disappeared. The prisoners instead of being closely confined were allowed to be outside all day and vegetables, fruit, eggs, beef, and pork were increased, or added to the daily dietary. The diet previously consisted chiefly of rice, dried beans, corn meal, sugar cane and fruit, with fresh vegetables and meat in small amounts at infrequent intervals. The oedema disease of the prisoners appears to have been very similar to the "nutritional oedema" observed in some parts of Europe during the War. The latter was probably due to the effects of a low calorie diet with a low protein content. There was no calorie deficiency in the diet of the Haitian prisoners prior to 1920 but there was a definite deficiency of animal protein and this is thought to have been the most important etiological factor in the production of oedema disease. A deficiency of vitamins A, B, and C may have been a contributory factor, as may lack of sunlight [see *Tropical Diseases Bulletin*, Vol. 17, p. 249; Vol. 22, p. 157].

H. N. H. Green.

DE RIVAS (Damaso). Nova contribuição para o tratamento das infecções intestinaes ou de outra natureza pelo methodo thermico intra-intestinal. Conferencia feita na Associação Medica de Porto Rico. [**The Treatment of Intestinal Infections by Hot Liquids.**—*Rev. Med.-Cirurg. do Brasil.* 1929. Feb. Vol. 37. No. 2. pp. 33-39. [2 refs.]

Protozoal and metazoal parasites are destroyed by a temperature of 45°-47° C. in 10-15 minutes. The author treats infections of the large bowel by rectal administration of saline at a temperature of 50°-55° C., in order that it may not fall below 45° for the specified time. Where the small intestine is to be treated, the fluid is passed by a duodenal sound. [See also this *Bulletin*, Vol. 25, p. 450.]

H. Harold Scott.

BORRUSO (Gaetano). Su un caso di favismo. [**A Case of Favismus.**]—*Polichinico. Sez. Prat.*, 1929. Mar. 11. Vol. 36. No. 10. pp. 338-341. [14 refs.]

The term Favismus is applied to a symptom-complex of rise of temperature, jaundice, anaemia and haemoglobinuria, following the ingestion of the bean or apparently even inhalation of the perfume of the flowers. The condition occurs widely in Sardinia, Sicily, Southern Italy, and Calabria, and sporadic cases are met with in Rome, Pisa and Mantua. Other districts seem to be free from it.

Details are given of one patient, a man of 56, who had had a similar attack 34 years previously. He was very ill, with icterus, mental hebetude, involuntary passage of bile-stained urine, and the anaemia was severe, red corpuscles 1,490,000 per cmm., Hb 30 per cent. When he left hospital a month later, the red cells had risen to 3,782,000 and the Hb to 65 per cent. Experimental inoculation, intravenous or subcutaneous, of 20-40 cc. of watery extract of fresh or dried beans into guineapigs or rabbits produced polypnoea, tremors and convulsions, symptoms quite different from the clinical picture of favismus. The author inclines to the idea that the disease is an expression of anaphylaxis.

H. Harold Scott.

CHAVARRÍA (A. Peña) & NAUCK (Ernst G.). Zur Rhinoskleromverbreitung in Mittelamerika. [**Distribution of Rhinoscleroma in Central America.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Jan. Vol. 33. No. 1. pp. 12-18. With 8 text figs. [San Juan de Dios Hosp., San José, Costa Rica.]

Two cases are here reported from Costa Rica, where five cases have been seen in four years. For the rarity the reason is suggested that the number of Indians is small. The patients were treated with intravenous injections of tartar emetic: 35 and 45 injections of a 5 per cent. solution with 0.5 to 1.0 cc. for a dose, and with X-rays, with complete success in one case; in the other there was improvement and cure was completed by removal of tissue.

A. G. B.

LEGENDRE (J.). La mère, la chèvre et l'enfant en Afrique tropicale. [**Mother, Goat and Child in Tropical Africa.**]—*Presse Méd.* 1929. Jan. 2. Vol. 37. No. 1. pp. 11-12. With 3 text figs.

Legendre questions whether anyone has seen a baby in Tropical Africa or Madagascar fed on any milk other than human. The result is that if the mother fails and a human substitute is not available the infant succumbs. To this and the practice of abstaining from sexual relations during the long period of lactation, 20 months or more, he ascribes the failure of growth of population in many parts of Africa. He suggests that the Africans should be induced to make use of goat's milk either direct or by a feeding bottle when the mother's fails and to wean their infants at the same age as in Europe.

A. G. B.

DONNISON (C. P.). Blood Pressure in the African Native. Its Bearing upon the Aetiology of Hyperpiesia and Arterio-Sclerosis.—*Lancet*. 1929. Jan. 5. pp. 6-7. [7 refs.]

The investigations recorded in this paper were made on natives resident in a large reserve, that of S. Kavirondo in Kenya Colony, living in primitive conditions, that is conditions which have remained unchanged probably for centuries. Men only were examined, chiefly young men recruited for labour needs in various parts of the Colony; older men were seen when the author was on tour. The places of examination were at 5,700 feet and down to 3,500. It seems unlikely, he writes, that such altitudes could have any marked influence upon the blood pressure of the inhabitants. The ages were estimated. The instrument used was an aneroid sphygmomanometer by Down Bros. A series of 1,000 examinations was made on apparently healthy natives ranging from 15 years to 70 or 80 years.

Age Group.	Cases Examined.	Aver. Pulse-Rate.	Blood pressure.			Normal in Europeans and Americans.		
			Aver. Syst.	Aver. Diast.	Aver. Diff.	Syst.	Diast.	Diff.
15-19 ...	99	68.71	123.07	81.89	41.18	123	80	43
20-24 ...	100	63.22	122.76	79.99	42.77	125	81	44
25-29 ...	100	63.57	126.37	83.96	42.41	126	82	44
30-34 ...	115	64.55	126.05	84.73	41.31	127	83	44
35-39 ...	100	69.46	125.55	85.86	39.69	128	84	44
40-44 ...	93	68.52	118.32	81.29	37.03	129	85	44
45-49 ...	96	69.17	113.19	75.50	37.69	131	86	45
50-54 ...	100	72.20	109.79	74.09	35.70	133	87	46
55-59 ...	100	70.73	106.59	69.63	36.96	135	88	47
60 and over ...	97	75.23	105.76	66.98	38.78	140+	90+	50+

Syst.=systolic; diast.=diastolic; diff.=differential.

Up to the 4th decade the figures for the two races approximately agree. After that the blood pressure, both systolic and diastolic, tends to come down in the African, whereas in the white races it continues to rise till the 8th decade.

The author spent over two years at a native hospital where about 1,800 patients were admitted and thus had a good opportunity of recognizing pathological conditions which might be the result of high blood pressure. No case of raised blood pressure was encountered and never was a diagnosis of arteriosclerosis or chronic interstitial nephritis made. Hypertrophied hearts, without intrinsic cardiac disease, are very rarely met with in the African. In autopsies it has been noted that the African usually shows much less atheroma in the aorta than does an average European of the same age.

The results, then, of this investigation support the view that hyperpiesia and arteriosclerosis are diseases associated with civilization. Considering the causation of high blood pressure the author discusses the two main views, the toxæmic theory, and that of the over-responsive vaso-motor system, or mental stress theory; he favours the latter and

concludes that differences in the evolution of the two races must be held responsible for the differences in the normal standards of blood pressure.

A. G. B.

GALSTAUN (S. G.). The Radiological Appearances found in Amoebic Hepatitis and Madura Foot.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 429–433.

Amoebic hepatitis. The author has had many cases in which the ordinary methods failing, he has been the first to diagnose the condition. Histories of three cases are given. He concludes:—

“Radiology is of the greatest value in the diagnosis of hepatic abscess and amoebic hepatitis.

“The chief radiological signs are:—

“1. Fixation of the diaphragm on one or both sides, or limitation of movement.

“2. Enlargement of the liver.

“3. Raising of the level of the diaphragm on the affected side.”

Madura foot. He has been unable to find any adequate description of the radiological appearances of this condition. From his experience of many cases in a period of three years he concludes:—

“The radiological appearances of Madura foot are in some respects similar to those of tubercle with certain characteristic differences:—

“1. The disease starts externally and invades successively subcutaneous tissues, muscles, joint capsule, synovial membrane and bone.

“2. It never starts as a bone focus as in many cases of tubercle.

“3. The cuneiforms are the seat of election.

“4. The ‘pencilling’ of outline seen in the decalcified tuberculous bone is not characteristic of Madura foot.”

In discussion Colonel SHORTEN remarked that much benefit and in some cases complete cure may result from medium deep X-ray therapy given in fractional doses.

A. G. B.

CLAXTON (E. E.). Some Observations on the Anaemia of Indian Labourers and its Treatment with Fresh Liver.—*Malayan Med. Jl.* 1929. Mar. Vol. 4. No. 1. pp. 8–11.

Anaemia is a common symptom of Tamil labourers. The causes are various, and include malaria, helminthiasis, malnutrition, chronic sepsis (chiefly oral), chronic colitis, bleeding piles, chronic nephritis, pregnancy, the commonest being ankylostomiasis and chronic malaria. The anaemia accounts for the poor work done by the coolies. The author lays stress on the importance of frequent inspection with a view to early detection of cases, because the longer an infection has lasted the more difficult it is to treat. After detection and removal of the cause of the anaemia liver treatment accelerates the recovery of the normal state of the blood. A series of 239 cases has been treated, and only those whose haemoglobin has been less than 60 per cent. (Tallquist) have been included in the observations. The method of preparation is as follows:

“Fresh liver is taken and minced very finely; it is then covered with equal weight of water, and enough common salt is added to make the solution hypertonic. The mixture is stirred, and allowed to stand for

1½ to 2 hours : when it is heated gently on a water bath for 20 minutes, care being taken that it does not boil. The filtrate, after straining through muslin, is ready for use. Proportion of ingredients used are 2½ lbs. fresh liver, two pints water and ½ oz. common salt. The dose given is 2 ozs., twice a day on two days in a week."

The table shows 10 selected cases.

TABLE A.

Hospital reference No.	Age and Sex.	Cause of Anaemia.	Hb. per cent. on admission.	Days in Hospital.	Haemoglobin.		
					On discharge.	After one month.	After two months.
L.725	7 M.	Amoebic dysentery	25	17	60	Returned to India.	
B.D. 167	7 F.	Anky. and Malaria B.T.	20	18	65	70	90
L.494	10 M.	Anky.	45	85	60	70	60
L.712	11 F.	Ascariasis	35	8	65	65	80
L.557	28 H.	Anky	45	10	60	60	60
L.599	26 M.	Malaria B.T.	40	9	65	60	80
L.633	26 F.	Malaria S.T.	45	12	60	60	65
L.708	26 F.	Anky. ...	50	8	65	60	80
B.W.281	28 M.	Anky. ...	45	11	60	65	70
S.S.445	51 F.	Anky. and pneumonia	40	23	60	50	Paid off

This series of cases was compared with a similar series from the preceding year ; the treatment was almost identical with the exception of liver. Liver shortens the average period in hospital by 4½ days and the average rise of haemoglobin is increased by 6.9 per cent. Moreover, the patients are discharged in better condition. Difficulty was experienced in getting liver owing to an epidemic among goats which led to large losses. Better results might have followed daily administration. The most resistant cases were pregnant women with chronic malaria and hookworm. The essential preliminary, of course, is the removal of the cause.

A. G. B.

BIRT (Ed.). Gutartige Strikturen des Rektums. [**Non-Malignant Strictures of the Rectum.**].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Jan. Vol. 33. No. 1. pp. 1-11. With 7 text figs. [Paulun Hosp., Shanghai.]

A lecture delivered on June 9th 1928 before the Medical and Natural Scientific Society at Shanghai, a city in which, as the reader will gather, there is no dearth of rectal surgery. Fistula-in-ano is very common. Malignant disease is present in many forms, and the large bowel is not infrequently the seat of carcinoma. Helminthiasis is widespread, and infection with the *Schistosoma japonicum* often leads to appalling local conditions. Tubercle, syphilis and gonorrhoea also play their part, and dysentery, in both its amoebic and bacillary forms, is a powerful factor in the production of intestinal lesions.

Even under favourable circumstances the normal power of resistance of the average Chinaman would appear to be considerably lower than that of the European, a matter of importance when the question of radical surgical intervention arises. The surgeon's difficulties are

increased by the general aversion of the Chinese to surgery when practised upon their own persons, and by the fact that many cases of rectal disease when they first come to notice have already reached an inoperable stage. The opium habit constitutes another adverse influence.

The lecturer, with the aid of pathological specimens, reviews some eight cases of benign rectal growth and stricture under his care in the year 1927, and to their aetiology and pathology the lecture is mainly devoted. Other cases also are quoted for purposes of comparison. In at least one instance syphilis appears to have been the causative factor, and in another gonorrhoea. Most of the remainder were undoubtedly due to the schistosome, tubercle being perhaps a contributory in one individual. Various surgical procedures were practised, ranging from simple dilatation to resection of the rectum or colostomy. Results appear to have been satisfactory, allowance being made for the difficult nature of the cases and the necessarily reduced condition of the sufferers. The lecturer is insistent upon the fact that in the type of case with which he is called upon to deal in Shanghai surgery only can afford relief, and that drugs must be looked upon merely as adjuvants. He discusses difficulties of diagnosis, the assistance afforded by the Roentgen rays, and the possibility of conditions originally benign taking on malignant action. In a supplementary note, having reference to a case later than those considered in the lecture, *Clonorchis sinensis* is suggested as a potential agent in the production of serious intestinal disease.

J. J. Pratt.

GROOT (K. P.). Eenige gevallen van jicht bij Javanen. [**Cases of Gout in Javanese.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. May 4. 73rd Year. 1st Half. No. 18. pp. 2142-2149. With 4 text figs., 1 chart, & 3 figs. on 1 double plate. [4 refs.]

Gout is generally believed not to occur in the Malay race. Contrary to this contention, the author asserts that he has seen 7 cases in Javanese in a material of about 40,000 cases. In 3 of these cases the diagnosis was dependent on clinical observation. By puncture the swellings were shown to contain deposits of uric acid, and X-ray examination showed the typical picture of gouty arthritis. No special cause could be found for the affection in these men, whose habits of life did not differ from the average native's (practically vegetarian diet, no alcoholics). The patients' complaints were not very marked, though the swellings were remarkably large and the attacks of very long duration in comparison with the European type of gout.

W. J. Bais.

WILLIAMS (L. H.). **Operative Gynecology in the Tropics. A Report of 100 Consecutive Gynecological Operations in the Tropics.**—*U.S. Nav. Med. Bull.* 1929. Apr. Vol. 27. No. 2. pp. 370-379. [9 refs.]

These operations were performed at Cape Haitien, Haiti, in a period of two years. Nine of the patients were Caucasians. Of 38 hysterectomies, 34 were for myoma of the uterus; this is frequently met with in negro women and is a common cause of disability. The cause is unknown. Chronic pelvic inflammatory disease, of gonococcus

origin, is a prolific cause of pain, disability and sterility among native women. Rectovaginal fistula is not infrequently seen, usually in syphilitic women with third stage lesions and often accompanied by rectal stricture. Elephantiasis of the vulva, either filarial or treponemic in origin, is fairly common, much more common than is generally believed, for many cases do not come to light. The author dwells on the necessity in the tropics for pre-operative treatment.

A. G. B.

BLANCHARD (M.). Au sujet des accidents d'intolérance de la ponction lombaire. [**Symptoms of Intolerance in Lumbar Puncture.**]—*Bull. Soc. Path. Exot.* 1929. Apr. 10. Vol. 22. No. 4. pp. 257-259. [2 refs.] [School of the Colonial Health Service, Marseilles.]

The author with LAIGRET [this *Bulletin*, 1924, p. 924] reported that the native of the Congo bears lumbar puncture extremely well, and that in fifteen years' practice at Brazzaville no symptoms, early or late, after puncture had ever been observed. He here discusses the cause of this tolerance and decides that it is due to the vegetative nervous system of the negro being "almost completely inexcitable."

A. G. B.

LE ROY DES BARRES. La polymyosite des pays chauds. [**Polymyositis of Hot Countries.**]—*Rev. Méd. et Hyg. Trop.* 1929. Mar.-Apr. Vol. 21. No. 2. pp. 33-49. [35 refs.]

A fairly complete account is given of this condition, known locally as lambo and bungpagga, and described fully by KULZ (1913). The list of references is useful and goes back to 1877. The author has seen 25 cases, but it is not clear to what extent in his paper he is drawing upon his own experience. The conclusion reached is that the myositis of warm countries does not differ from that of temperate countries, and since it is only the localization of a pyaemia it should not be regarded as a distinct morbid entity.

[For recent references to this subject see this *Bulletin*, Vol. 20, pp. 27-29, 904; Vol. 22, p. 347; Vol. 24, pp. 833-4.]

A. G. B.

LISTER (Spencer). **An Electrical Thermometer for Groups of People.**—*Jl. Med. Assoc. South Africa.* 1929. Mar. 23. Vol. 3. No. 6. pp. 155-157. With 2 text figs.

The apparatus here described and figured was devised to pick out native mine labourers with abnormal temperatures, these abnormalities to be submitted to further tests for the detection of tuberculosis. Clearly it might be useful to detect abnormalities in any body of natives with whom the use of a mercurial thermometer would take up too much time. The apparatus consists of a number of thermocouples, one of which is to be placed under the tongue, the other in a thermostat kept at 98.4°, a moving-coil galvanometer with reflecting mirror, switchboard, calibrated scale, and electric lamp. The whole is clearly described.

A. G. B.

FRANCHINI (Gianni). Di una caratteristica sindrome influenzale in Tripolitania. [**A Peculiar Influenzal Syndrome in Tripolitania.**—*Arch. Ital. Sci. Med. Colon.* 1929. May 1. Vol. 10. No. 5. pp. 226-230. English summary p. 230.

An epidemic broke out early in January 1929 which attacked 209 of the coloured troops out of 1,000. It was characterized by sudden onset of fever to 40° C., with severe headache, general muscular pains, a troublesome dry cough, dyspnoea, anorexia, frequent epistaxis and great weakness. The spleen was not enlarged and the physical signs were very slight or even absent. Ordinary antipyretics proved ineffectual, but quinine in doses of 25 cgm. four times daily relieved all the symptoms in a few days, though the debility and anorexia remained for another week or so.

H. Harold Scott.

RUBERTI-FIERA (Ernesto). Il "bigio." [**"Bigio."**—*Ann. di Med. Nav. e Colon.* 1929. May-June. Year 35. Vol. 1. No. 5/6. pp. 336-337. With 4 figs. on 3 plates (1 coloured).

"Bigio" is the name given to an affection of the lower lip, involving the surface of the mucosa, not extending to the skin. It occurs throughout Somalia, but in the northern part is sometimes known as Habèb. It starts usually in the centre of the lip and extends to the edge and to the commissure; it is slow in growth and does not itch. There is a little secretion of a serous nature which forms a yellowish crust. The condition remains stationary for a long time, "two to twenty years," and when it heals leaves a light red surface, the pigment having been destroyed. It is not syphilitic and the cause is not known. Some have ascribed it to the use of Rumi (the massuah of the Arabs), but it is seen in small children who do not use Rumi. Various forms of treatment have been tried—local applications, antimony, arsenobenzol—but without satisfactory result. Some photographic reproductions and a good coloured plate show the appearance clearly.

H. Harold Scott.

WINCHESTER (J. W.). **Observations on the Incidence of Lobar Pneumonia among Tamils and Chinese in Malaya.**—*Malayan Med. Jl.* 1929. June. Vol. 4. No. 2. pp. 75-77. [5 refs.]

The author studied the hospital records of the General Hospital, Singapore, from January 1926 to May 1928, in which period 540 cases of lobar pneumonia were admitted. Of these 277 were in Tamils and 165 in Chinese, though the total Chinese admissions were twice as large as the total Tamil; i.e., lobar pneumonia was nearly 3½ times as common in Tamils as in Chinese. The case fatality was 51·8 per cent., but of this the Chinese share was 72·7 and the Tamil 44·7 per cent.; the explanation is that whereas the Tamils, mostly employees under supervision, are admitted on the 2nd or 3rd day, it is unusual for the independent Chinaman to come to hospital till he has been ill a week. The author studied the possible factors of the high pneumonia incidence in Tamils. Housing, alcoholism, exposure and fatigue, diet, are considered in turn; it is only in diet that there is a definite difference between the races. The Chinese coolie spends a far larger

proportion of his earnings on food than does the Tamil. Both rely chiefly on rice, but the Chinaman eats flesh once or twice a day and usually a large piece of extremely fat pork, whereas the Tamil indulges only once or twice a week in mutton or goat flesh. Calculating the requisite number of calories required, the author estimates that the Tamil needs $1\frac{1}{2}$ lb. of rice and that he eats about half this quantity, whereas the Chinese coolie comes near the number of calories he needs. The tentative conclusion is that the large incidence of pneumonia among the Tamils is due to the low caloric value of their diet. [Another possible cause is the absence of the anti-infective vitamin A (see *Bulletin of Hygiene*, Vol. 4, p. 97)].

A. G. B.

BOEREMA (J. C.) & VRIJ (M. P.). **The Ultra-Violet Radiation in Tropical Sunlight.**—*Proc. Roy. Acad. Amsterdam*. 1929. Vol. 32. No. 4. pp. 435-439. With 1 plate. [6 refs.] [Summary appears also in *Bulletin of Hygiene*.]

According to the authors, it has been alleged that sunlight in the tropics is, as compared with that in other parts of the world, weak ultra-violet radiation. Their observations in Batavia indicate a contrary state of affairs. According to DORNO, the shortest wave length recorded at Davos is 2969 A.U., and only for one hour daily at the most favourable season. In Batavia there was found an extension of the solar spectrum to 2954 A.U. for a period of four hours daily during three months. It is considered that there is probably also a greater intensity of radiation.

R. G. Bannerman.

TRAUT (I. I.) et al. **Reports of Work of the Laboratory for the Study of Poison Substances of the Plant Protection Department of the People's Commissariat of Agriculture, R.S.F.S.R. Part VI.** 69 pp. 1929. Saratov. [In Russian. English summaries on pp. 21, 39, 60, 64, 68.]

During the years 1927 and 1928 a number of experiments were conducted on the efficacy of various poisonous substances for the wholesale destruction of ground-squirrels (*Citellus pygmaeus*) and their ectoparasites in the south-eastern provinces of Russia. The chief substances used were calcium cyanide, strychnine and carbon bisulphide. "Cyanogas" calcium cyanide $[\text{Ca}(\text{CN})_2]$ containing 42 per cent. CN was used in powdered form. From 5 to 60 gm. of the cyanide was introduced into each burrow, the entrances to which were then filled with grass and covered with earth.

In the experiments described 137 burrows were thus treated. The results proved to be unsatisfactory, since in only 86 burrows were all the occupants destroyed. In the remaining burrows, especially in those containing the young, the animals were able to isolate themselves from the fumes of HCN by plugging up part of the passage with earth. The ineffectiveness of this method is attributed mainly to the slow evolution of CN and the fact that the fumes, being lighter than air, do not diffuse rapidly enough into the deeper parts of the burrow. As regards the effect of the cyanide upon the ectoparasites, only part of these were destroyed on the dead animals.

A series of experiments were conducted with poison baits. The best results were obtained with millet baits soaked in a 1/400 solution of strychnine. In fresh baits the amount of strychnine was estimated at 152 mgm. per 100 gm. of millet. The efficiency of the baits did not suffer from exposure in the open, though the amount of strychnine per 100 gm. millet fell to 130 mgm. after seven days, to 97.8 mgm. after 11 days, to 73.4 mgm. after 25 days and to 24.5 mgm. after 36 days.

In a large-scale experiment about 12,800 hectares containing about 850,000 burrows were baited with this poison, the total amount used being 4.2 kgm. of strychnine and 3,720 kgm. of millet. The baits were distributed in doses of 4 gm. placed near each burrow. When the burrows were examined seven days later it was found that nearly 100 per cent. of the ground-squirrels in this area had been destroyed. A large number of ground-squirrels were poisoned by baits placed amongst rye and wheat crops.

Various other substances were tested for the simultaneous destruction of ground-squirrels and their ectoparasites in burrows. Carbon bisulphide proved to be most satisfactory for this purpose. It was introduced into the burrows on cotton wool pads or by means of a syringe. A lighted match or red-hot charcoal was then thrown in and the entrance to the burrow plugged with earth. The explosion of the gas within the burrow resulted in the complete extermination of the fleas and other ectoparasites together with their hosts in 50 per cent. of all the burrows treated, and in a partial destruction in 25 per cent. of the burrows. Carbon bisulphide worked best when introduced in doses of 15 gm. per burrow, but under certain conditions smaller doses may be sufficient.

C. A. Hoare.

MATTLET (G.). Deux abcès d'allure torpide causés par le staphylocoque. [**Abscess due to Staphylococcus.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Mar. 31. Vol. 9. No. 1. pp. 3-7. [7 refs.]

The author describes two cases of abscess of several weeks' duration. One of these contained at least 6 litres of pus. The staphylococci cultivated on agar from each abscess were two, one with cream-coloured colonies and the other with grey-white. In their characters the two were intermediate respectively between *Staph. aureus* and *citreus* and between *Staph. citreus* and *albus*.

W. F. Harvey.

HETHERINGTON (H. B.) & STEENSON (K. R.). **A Year's Hookworm and Yaws Work in the Solomon Islands.**—*Med. Jl. Australia.* 1929. June 29. 16th Year. Vol. 1. No. 26. pp. 856-861. With 15 text figs.

In 1921, Dr. LAMBERT, of the Rockefeller Foundation, carried out a hookworm survey of the British Solomon Islands and found an infestation of 60 to 80 per cent. This survey and the knowledge that yaws is almost universal in the Solomons led to the campaign of 1928. The campaign was financed by the Rockefeller Foundation and the Government of the Islands. The island of Malaita was chosen because it is the most densely populated and contains about half the population of the whole group, 60 to 70 thousand. The hookworm part of the campaign was rendered difficult by the existence of certain *tabus*: thus, the

native must have nothing to do with human excreta; he who possesses any portion of another's excreta can work magic against him, and it becomes a duty to compass the possessor's death.

The object of the campaign was to inspect and record every native in the district, treat all for hookworm and any who showed evidence of yaws; indeed, the authors would go further and treat all for yaws, believing that many who appear free have a latent infection. Three injections of neosalvarsan were given as a course, 0.45 gm. in each dose; it was thus hoped to reduce the sources of infection to a minimum. A detailed account is given of the personal and technical equipment and the method of working. A maximum of 300 persons a day was dealt with.

INCIDENCE OF YAWS AND EXTENT OF TREATMENT.

Population Census Returns.	Yaws Infections.		Stage of Infections.			Number Treated.	Number of In- jections.
	Number	Per- centage.	Pri- mary.	Second- ary.	Ter- tiary.		
18,438 ...	11,440	62	2.5 per cent.	30.5 per cent.	67.0 per cent.	11,405	30,491

The table gives the statistics of the yaws treatment. For hookworm over 16,000 treatments were given; the drug used is not disclosed.

A. G. B.

LUIGI (Fornara). Les lithiases chez le noir dans le Bas-Congo Belge. [**Calculi in Blacks in Lower Belgian Congo.**—*Ann. Soc. Belge de Méd. Trop.* 1928. Dec. Vol. 8. No. 3. pp. 311-314. [4 refs.]]

Most doctors practising in the Congo are of opinion that the natives are free from this group of diseases. The author suggests that this is because the lesions they produce are silent and pass unnoticed without the systematic performance of autopsies. He has found calculi in natives on the post-mortem table at Leopoldville as follows:—

Biliary	...	...	...	...	4/600 :	0.67 per cent.
Renal	...	...	...	...	2/600 :	0.34 per cent.
Pancreatic	...	...	...	...	0/120 :	0 per cent.
Vesical	...	...	...	...	3/120 :	2.5 per cent.
Urethral	...	...	...	...	0 :	0 per cent.

At Boma he has never seen such cases [how many autopsies is not stated]. Details are given of the stones removed. In none of the nine cases was it possible to discover in the liver or portal system schistosomes or their eggs.

A. G. B.

IBRAHIM (Aly Bey). [**Zeifulian Oration on Stones of the Ureter.**—*Jl. Egyptian Med. Assoc.* 1929. June. Vol. 12. No. 6. [In Egyptian. English summary pp. 71-79. With 6 figs. on 2 plates & 1 text fig.]]

In the Radiological Department of Kasr el Ainy Hospital, 10,434 patients were examined in 1927-8; 1,087 showed a positive finding

in the urinary tract and 114 had ureteric calculi. In an analysis of 100 consecutive radiograms of these, 28 cases showed evidence of bilharziasis. The author notes that a calcified bilharzial papilloma of the ureter is impossible to distinguish from a ureteric calculus.

A. G. B.

ALEIXO (A.). Melanonychia. [**Melanonychia.**]—*Brasil Medico*. 1928. Nov. 17. Vol. 42. No. 46. pp. 1281-1285. With 6 text figs. [4 refs.]

Melanonychia, Unha negra, Black-nail, is the name given to a condition in which black lines and streaks appear in one or more nails of the fingers or toes. There is no deformity of the nail, no atrophy, hypertrophy, desquamation or roughening; in fact, except for the colour there is no abnormality. No cause has yet been found except perhaps hyperchromia at the root of the nail. It is commonest in the dark-skinned, four out of five cases mentioned occurring in negroes. It is occasionally seen in subjects with naevi.

H. Harold Scott.

BOULAY (A.). Un cas de diabète sucré chez un noir d'Afrique. [**Case of Diabetes Mellitus in an African Native.**]—*Bull. Soc. Path. Exot.* 1928. Oct. 10. Vol. 21. No. 8. pp. 701-703. [2 refs.]

MONTEL has noted that while this affection is very rare among the natives of Cochin China, it affects the Hindus resident there severely, even those who are actively employed. LANGEN has noted the extreme rarity of this disease in Java. Though cases are noted in American negroes [see this *Bulletin*, Vol. 19, p. 430] the negro in Africa is believed to be refractory to diabetes. The case described is that of a Mussulman in Senegal with syphilis (B.W.+++), polyuria and loss of flesh, and glycosuria. He led an active life riding and walking over his landed property. For details consult the paper.

A. G. B.

HOWELLS (W. M.). **A Case in which no Diagnosis has been made.**—*West African Med. Jl.* Lagos. 1928. Apr. Vol. 1. No. 4. pp. 73-74.

Case of a native of about 35 years admitted into the C.D. hospital at Kumasi on the 12th day of his illness. There was oozing of blood from gums and pharynx, copious bright-red bleeding *per urethram*, and there had been bleeding from the bowel; the temperature was normal and there were no other signs or symptoms and no parasites. The man died early on the 3rd day in hospital. Post mortem slight nephritis was observed, and some necrosis and loss of epithelium of the bladder. The diagnoses considered were purpura, haemophilia, and onyalai; the cause of death suggested by the pathologist is snake-bite.

A. A.

TAYLOR (G.). **Deterioration and Preservation of Drugs in Nigeria.**—*West African Med. Jl.* Lagos. 1928. Oct. Vol. 2. No. 2. pp. 114-117.

An article which will be of value to the dispenser, medical or other, in hot climates as well as to the firms in temperate regions which export drugs and chemicals to the tropics. It cannot be summarized.

A. G. B.

RATTAN (Bhagwan). **Haemophilia in the Tropics.** [Memoranda.]—*Brit. Med. Jl.* 1928. Nov. 10. p. 844.

The case recorded was in a child at Ambala in the Punjab (30° N. Lat.).

A. G. B.

CAWSTON (F. G.). **The Need for Early Drainage in Tropical Pleural Effusion.**—*Jl. Trop. Med. & Hyg.* 1929. May 1. Vol. 32. No. 9. pp. 117-118.

Dr. Cawston writes of septic pleural effusions or abscesses, the treatment of which, once the diagnosis is made, is unaffected by latitude.

A. G. B.

MANALANG (C.). **Report of a Case of Rhinosporidiosis.**—*Philippine Jl. Sci.* 1929. Apr. Vol. 38. No. 4. pp. 437-440. With 6 figs. on 3 plates. [6 refs.]

In a boy aged 7 years. Appears to be the first case reported from the Philippines.

A. G. B.

REVIEWS AND NOTICES.

ROME. **L'agro romano nel primo quinquennio fascista. Relazione sull' incremento del bonificamento agrario e della colonizzazione nell' agro romano dal 1o gennaio 1923 (I) al 31 dicembre 1927 (VI).** [The Roman Campagna during the First Five Years of Fascist Government.—Report on the Progress of Agricultural Reclaiming and Colonization in the Roman Campagna from the 1st of January, 1923, to the 31st of December, 1927.]—191 pp. With 196 figs. & 3 folding maps. 1928. Roma: Tipografia Cuggiani, 35 via della Pace.

This report is concerned with the general agricultural and economic aspect of the intense effort which the Italian Government is making towards the reclaiming and the bringing under intensive cultivation of the Roman Campagna, over a territory of 135,000 hectares. In spite of the fact that the very important anti-malarial work which forms an essential part of this enterprise is only incidentally mentioned, the volume is well worthy of a note in this *Bulletin*. It is mainly a photographic documentation, demonstrating the original conditions of the Campagna, the works which are being carried out, the means which are being employed and the notable practical results already obtained. It is gratifying to see so many localities the names of which were sinisterly notorious, far afield, from the classical studies of the Roman School of Malariologists, transformed, or in the process of being transformed into florid and productive agricultural centres.

The book is splendidly illustrated with 196 photographs, plans and maps.

George Giglioli.

HASLAM (J. F. C.). **Schistosomiasis and Malaria in Relation to Irrigation.**—52 pp. With 5 maps & 2 figs. [12 pages of refs.] Empire Marketing Board 17. 1929. May. London: H.M.S.O. [1s. 3d.]

Major Walter ELLIOT, Chairman of the Research Grants Committee of the Empire Marketing Board, by which this brochure is published, in the preface which he contributes writes that Dr. Haslam's Report was prepared for the Irrigation Sub-Committee of the Committee of Civil Research as a convenient summary of practical lessons to be drawn from existing knowledge. This purpose it undoubtedly serves. The Report is clearly written and will be found by the professional as well as the lay man to be very interesting reading. It is not perhaps adequately realized in medical circles that "nearly one-third of the earth's surface receives only 10 inches of rain or less annually" even though it is well known that on such land "irrigation is generally essential if any form of profitable crop production is to be under-taken."

A valuable feature is the three maps of the world on Mercator's projection, one showing the distribution of rainfall of over 20, over 10 and under 10 inches, the second giving the distribution of the three forms of schistosomiasis, and the third that of indigenous malaria. In a pocket inside the cover will be found tracings from maps II and III which superimposed on Map I will "demonstrate that nearly everywhere that an irrigation project is likely, one or other or both of these diseases (malaria and schistosomiasis), both closely associated with water channels, is waiting on the threshold." The geographical bibliography of reported cases of schistosomiasis (pp. 41 to 50) cannot fail to be useful.

[In a personal communication, Dr. ATKEY, Director of Medical Services in the Sudan, has pointed out that my Report gives the impression that practically nothing has been done in that country to prevent the spread of schistosomiasis in the newly irrigated areas. The annual Medical Reports for the Sudan for the

years 1926 and 1927 show plainly that much has been and is being done. Even the 1926 Report, however, was not received at the London School of Hygiene until July, 1928 a few weeks before my finished Report was presented to the Irrigation Sub-Committee and, though a number of addenda were made before publication in 1929, these Reports from the Sudan were unfortunately overlooked. I much regret having unintentionally given a wrong impression of the actual state of matters in the Sudan.—J.F.C.H.]

A. G. B.

BRITISH INDIA. Report of the 7th Congress of the Far Eastern Association of Tropical Medicine, British India, December 5th-10th-24th, 1927.—193 pp. 1929. Calcutta. Government of India Press.

This is one of several volumes of reports connected with this meeting of the Far Eastern Association of Tropical Medicine in Calcutta, during December, 1927. The Report begins with a special list of the Patron (The Viceroy and Governor General of India) and Vice Patrons of this meeting and the names of the Officers of this 7th Congress, all from the I.M.S., except the General Secretary Treasurer, Dr. O. DEGGELLAR of Weltevreden, Java. Then we come to Officers of Component Countries, Members of the Council and Official Delegates and Representatives, etc., 25 pages. The net is wide spread, and draws in representatives from England, Egypt, all India, Java, Siam, China, Japan, the Pacific Islands, Australia and America. Joined to the Congress was an Exhibition, divided into two parts, Scientific and Commercial, the first for examples of research work at present being done in India, the second for equipment, literature and drugs for sale in India and, in certain cases also, the products of Indian manufactures. The opening address was delivered by Sir F. S. Jackson, P.C., G.C.I.E., Governor of Bengal. The Governor and Lady Jackson also attended the Congress dinner held on December 10th. The President of the Congress, Major General T. H. SYMONDS, C.S.I., K.H.S., I.M.S., read his address at the opening ceremony on December 5th. He gave a hearty welcome to visitors who had come very long distances, leaving work and country, to attend the 7th Congress, a meeting held for the first time in India since the first Congress was held at Manila in 1908. The last meeting was held in Japan, 1925. Pages 49 to 81 are occupied with business meetings of the Council, and with important work done at a General business meeting, held on December 8th. The following new resolutions were passed and will be in force in future: 1. "... hotel and touring expenses to be borne by the delegates or by their Governments and not by the Government of the country issuing the invitation," 2. "... that the Congress be held triennially instead of biennially," 3. "That a triennial subscription of three pounds sterling be paid in one lump sum." The resumé of the Proceedings of Scientific Sections (pp. 81-125) contains merely the names of subjects discussed in each section with the names of those who read papers which will no doubt be published in full in the Transactions. The rest of the volume is taken up with a list of members of the Far Eastern Association of Tropical Medicine.

J. H. Tull Walsh.

DESCHIEENS (R.) [de l'Institut Pasteur, Ex-Chef de Laboratoire à l'Hôpital Saint-Antoine] & CARVAILLO (R.). [Ancien interne pr. des Hôpitaux de Paris, Chef de Laboratoire à l'Hôpital Saint-Antoine]. **La coprologie en pratique médicale.** [Coprology in Medical Practice.]—pp. ix+129 With 17 plates (14 coloured) & 2 text figs. 1929. Paris: Editions médicales N. Maloine, 27 Rue de l'Ecole de Médecine.

War experience brought home to the medical profession the necessity for routine microscopical investigation of the stools in entero-colitis and

the present volume illustrates the growing importance which is attached in France to the macroscopical appearances and to the chemical, bacteriological and parasitological examination of the faeces. The earlier chapters are devoted to elementary technique and to the various reagents and tests advocated by the authors in faecal analysis.

Due stress is laid on the naked eye appearances of the stool such as its consistence, colour, odour and the presence or absence of pathological exudates like mucus, pus and blood. Tests for determining the acidity or alkalinity, albumen content, bile pigments and blood are detailed. For the detection of the latter, three tests are recommended, and Meyer's reaction with phenol-phthalein is found to be four times as sensitive as the Guaiacum test. An intestinal haemorrhage of only 0.5 cc. of blood in twenty-four hours can be detected by this means. Special significance is attached to these tests, since blood is altered rapidly in the bowel. Indeed it is only in lesions situated low down in the colon or where the rate of passage through the intestine is markedly accelerated that bleeding as such is detected by the naked eye.

The types of diarrhoea associated with deficient or ineffective gastric, biliary and pancreatic secretion are enumerated and a characteristic syndrome is detailed for each condition.

The subject of constipation is briefly reviewed. Colitis gravis is considered to have a multiple etiology, chief of which are amoebic, bacillary and flagellate dysentery, and such other diseases as tuberculosis, syphilis and cancer. Ulcerative colitis as a separate entity receives scanty consideration, and tropical physicians will be disappointed by the lack of information regarding cultural procedures in the bacillary infections. The incidence of intestinal protozoa in stools examined in Paris is stated to vary from 60-70 per cent., while that of *E. dysenteriae* (*histolytica*) is 5 per cent. *Chilomastix mesnili*, *trichomonas intestinalis* and *Giardia intestinalis* are all regarded as pathogenic.

*Lambli*a inhabits the level of the duodenum. It is also stated to frequent the biliary passages in heavy infections and to be associated with hypochlorhydria more frequently than hyperchlorhydria. Stovarsol, tréparsol and bismuth carbonate are the drugs recommended in its treatment. The last fifteen pages are devoted to the intestinal helminths infesting man.

This is a readable book, adequately illustrated, and of small dimensions. It suffers, however, from the inevitable defects of brevity. Many subjects, including that of therapy, receive too limited and uncritical a consideration for it to be of practical value to the medical practitioner.

N. Hamilton Fairley.

RUGE (Reinhold) [Prof. Dr., Marinegeneralstabsarzt a.d. in Klotzsche bei Dresden], MÜHLENS (Peter) [Prof. Dr., Marinegeneralarzt a.d. und Vorsteher der klinischen Abteilung am Tropeninstitut in Hamburg] & ZUR VERTH (Max) [Prof. Dr., Marinegeneraloberarzt a.d. und Oberregierungsmedizinrat in Hamburg]. **Krankheiten und Hygiene der warmen Länder. Ein Lehrbuch für die Praxis.** [Diseases and Hygiene of Tropical Climates.] 3rd Edition, completely revised.—pp. x+494. With 8 plates (6 coloured) & 489 text figs. 1930. Georg Thieme, Verlag, Leipzig. [Paper M.39-60; Bound M.32.] [Received Dec. 2, 1929.]

In the preface to this edition it is announced that it contains the latest researches on tropical medicine and hygiene with a full account of the application of drugs made available by German science, such as plasmochin, neostibosan, etc. The cosmopolitan helminthes have been included. There are new chapters dealing with variola, tularaemia, cholera, rhinoscleroma, trachoma, and various tropical skin diseases. A number of the older illustrations have been replaced by newer and better

ones. The requirements of the ship's surgeon travelling in the tropics have been considered specially. Although much new matter has been added the authors have endeavoured to keep down the size of the work.

The book is divided into two sections, one dealing with tropical hygiene, the other with tropical diseases. The latter is subdivided into: I. Infectious diseases. II. Diseases produced by worms and arthropods. III. Tropical skin and venereal diseases. IV. Poisoning by animal and vegetable poisons. V. Surgery in the tropics. VI. Distribution of cosmopolitan diseases in the tropics. Each of these is again subdivided into various sub-headings. There is an appendix and subject index.

Pride of place is largely given to German work. This is not unnatural. Since, however, our knowledge of tropical disease has been and is being advanced by workers of various nationalities all over the world, the value and breadth of outlook of the volume would have been increased by the inclusion of a larger amount of the work done by investigators of other nations. The authors have avoided this temptation.

Much of the medical zoology and other matter might have been dealt with in an appendix, as has been done, with advantage, in MANSON's textbook. The text is rather overloaded by the wealth of zoological detail, and this, to some extent, distracts the attention from the account of the clinical symptoms, diagnosis and treatment. An appendix would also have admitted of fuller treatment of these.

In dealing with the diagnosis of kala azar more details are required in the description of the operation of spleen puncture in order to avoid accidents. Regarding the antimony test in kala azar the name of the discoverer is CHOPRA, not Chopras. It would have been desirable to have referred to LLOYD's recent work on protein fractions of the blood serum which has an important bearing on the diagnosis, prognosis and treatment of kala azar.

No account is given of the recent valuable work of FLETCHER and his colleagues on tropical typhus in Malaya.

The recent work of ROGERS on the epidemiology of cholera is not alluded to, nor is the question of pilgrim traffic discussed, although it is a most important factor in the spread of cholera in India.

The interesting disease known as rhinosporidiosis is very briefly referred to, and no details regarding the parasite—not even its name—are given.

In some parts of the volume the type is very small and reading is very trying to the eyes. It is well illustrated mostly from photographs.

The book contains much useful information and sound advice. To those familiar with the German language it can be recommended as a reliable guide to tropical medicine and hygiene.

E. D. W. Greig.

HOEPLI (R.), Hsü (H. F.) & Wu (H. W.). **Helminthologische Beiträge aus Fukien und Chekiang.** [Helminthological Contributions from Fukien and Chekiang.]—*Beihefte z. Arch. f. Schiffs- u. Trop. - Hyg.* 1929. Vol. 33. No. 1. pp. 1-43 [1-43]. With 15 text figs. & 12 plates.

This valuable contribution to comparative helminthology is divided into three parts: the first is a study on the host reactions to certain parasites, the second a description of some new species of nematodes (mostly bird filarias, but including a new species of *Onchocerca*, *O. fülleborni*, from the connective tissue round the vagina of a porpoise) the third a description of some new free-living nematodes. The two last parts contain little of human interest. The first part, however, although it describes no lesions caused by human parasites, is of considerable medical importance. The writers have studied a variety of nematodes and flukes (including *Spirocerca* from the stomach of the dog, an ascarid from birds, one of the gape-worms and a fluke related to *Paragonimus*). In most cases they find that the parasite causes an inflammatory process in the host with the production

of cell-infiltrations (poly- and mono-nuclears mostly) and a certain amount of tissue destruction. In some (e.g., *Spirocerca* and the fluke) encapsulation is found. These host reactions are generally accompanied by an eosinophilia—a notable exception being *Spirocerca* in the stomach and aorta of the dog.

The writers have also studied histologically the food of the worms. *Spirocerca* feeds on polymorphonuclear leucocytes and red cells, *Tetrameres* (in birds) on the secretion granules of the glands of the alimentary tract; the fluke feeds on leucocytes—including eosinophiles—while the gapeworm sucks blood from the wad of tissue in its mouth capsule; the ascarid, on the other hand, secretes a fluid which digests the tissue around the mouth opening and absorbs this material.

The paper is well illustrated with photographs and drawings, and is an addition of outstanding interest to the neglected subject of helminth pathology.

T. W. M. Cameron.

PATTON (Walter Scott) [M.B., Ch.B. (Edin.), F.E.S., Dutton Memorial Professor of Entomology, Liverpool Univ. & Liverpool School of Trop. Med.] & EVANS (Alwen M.) [D.Sc., Lecturer on Entomology, Liverpool School of Trop. Med.]. **Insects, Ticks, Mites and Venomous Animals of Medical and Veterinary Importance. Part I.—Medical.**—pp. x+785. With frontispiece, 374 text figs., 60 plates, 3 maps & 1 large illustrated revision sheet. 1929. Published privately & obtainable only from the Entomological Dept., Liverpool School of Tropical Medicine. [20s.]

Mr. Kipling's Neolithic poet, provoked by critics to homicidal fury, was informed by a soothing nocturnal apparition that

“ ‘ There are nine and sixty ways of constructing tribal lays,
And every single one of them is right ’ ”

Be that as it may, the method of “ constructing ” adopted by the authors of the volume before us has been to reprint *in extenso*, and in serial order, the instruction imparted by the twenty-eight lectures, followed by demonstrations and laboratory work, forming the course for the Diploma of Tropical Medicine given by them at Liverpool. A system of book-making such as this in a work of reference, which, as we are told by the senior author in a printed slip inserted in the copy submitted, “ replaces Patton and Cragg's ‘ Textbook of Medical Entomology,’ which is now out of date and out of print,” has obvious drawbacks. To mention only one: in order to discover all that is known and stated about a given insect, it is often necessary in the present instance to consult a number of widely separated pages, and many scattered illustrations. To a reader accustomed to the straightforward methods followed in ordinary entomological text-books, the result is bewildering. In their Preface (p. v), the authors state that the work has been written “ primarily ” for “ medical officers and others taking post-graduate courses in Tropical Medicine,” yet they admit that “ the book contains far more than the medical officer requires to know of the subject, from the standpoint of the examination for the Diploma of Tropical Medicine . . . ” A little further on, to our astonishment, we read that the book “ has been primarily written for the medical officer approaching the subject for the first time ”; were this really so, alarming-looking terms such as “ mesanepisternum,” “ meskatepisternum ”—not often used, even by professional entomologists—might well have been omitted from the legends to certain figures. Without in any way desiring to belittle the importance of Medical Entomology, we venture to think that a medical man, who practises his profession either in the tropics or at home, can never hope to be “ primarily ” an entomologist; a certain lack of sense of proportion on the part of the authors therefore seems

evident, and it would have been kinder to the tyro to endeavour to impart knowledge in smaller doses. On the following page the authors write : " The second, and perhaps the most weighty reason for writing this book is, to make available in handy form not only the essentials of the subject, but a great deal of more detailed information which is at present neither available in books on entomology, nor even in papers on the subject." The reasons given by the authors for including " more detailed " information of this kind leave the reviewer unconvinced ; he still considers that its proper place would be in an advanced text-book on general entomology, or in papers published in scientific journals ; and since the volume with which we are dealing weighs some 4½ lb., its " handiness " is open to question. The authors would seem to some extent to have been carried away by their enthusiasm ; the statement (Preface, p. viii) that the Liverpool School of Tropical Medicine possesses "*unique* (reviewer's italics) collections of mosquitoes, midges, Tabanidae, myiasis-producing Diptera, and their larvae, as well as fleas, mites, ticks, etc." is evidence of this.

As is only natural, the greater part of the book under consideration—some 500 pages, including, in addition to morphological and anatomical details, valuable notes on bionomics and, wherever possible, control—is devoted to the Diptera. Fleas, bugs, ticks and mites occupy some 184 pages ; but poisonous snakes, although a figure of an Indian cobra is stamped upon the cover, are, like scorpions, dismissed in a single page. The book is packed with information, and well and copiously illustrated ; but there are no lists of either contents, figures or plates.

A few obvious misprints have been noted but, in a work of such magnitude and covering so wide a range as the present, to point them out would be mere hypercriticism. The authors, however, are guilty of certain errors which should not be allowed to pass uncorrected, and some of which may be mentioned here. Thus, in taking it upon themselves to ignore the frontal (ptilinal) suture as a character of major taxonomical value among the higher Diptera, with the result that they actually include the Syrphidae (Hover-flies) among the Muscidae Calypteratae, they are basing a reactionary conclusion upon a premise which is false. Again, in stating that the Diptera commonly grouped under the designation Pupipara " are erroneously believed to deposit a pupa," Prof. Patton and Dr. Evans are themselves mistaken ; that the so-called Pupipara are in fact larvi- and not pupi-parous has been known to all Dipterists for a very long time. Moreover, in treating the Hippoboscidae in a similar manner to the Syrphidae (*vide supra*), the authors have taken a course to which we think few entomologists will assent. *Pace* MIALl and HAMMOND and the present authors, the term " Harlequin flies " is not a vernacular designation of the large harmless midges of the genus *Chironomus* ; and (in spite of the late Prof. Maxwell LEFROY) *Fannia scalaris* is not " popularly known as the ' latrine fly.' " In their account and figures of the African Floor Maggot fly (*Auchmeromyia luteola*), the authors strangely enough have confused the sexes, the characters given for the male abdomen really applying to that of the female. Lastly, in treating of lice, the incorrect and meaningless form " Anopleura " is used (pp. 541, 542, 551), instead of Anoplura—the original and correct name of the order to which these insects belong.

E. E. Austen.

TROPICAL DISEASES BULLETIN.

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[No. 3.

MALARIA.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 2. pp. 599-867. [**Malaria : Control (11 papers), General (10 papers), Treatment (9 papers).**]

The discussion on Malaria at this Congress was opened by Sir MALCOLM WATSON, who dealt with the methods employed by the Government of the Federated Malay States in the control of malaria. It is the policy of that Government that each land owner should be responsible for anti-malarial measures on his own land. In small holdings, towns, and villages, the Mosquito Destruction Boards, which have been set up in all districts, may assume the burden and recoup themselves by an assessment. The Government Railway is responsible for railway reservations, and the Mosquito Boards for all state lands. A Central Health Board has now been set up under the Health Board Enactment, with Local Boards in specified areas which submit to it recommendations for curative measures, such as hospitals and ambulances, the employment and payment of medical practitioners and attendance on estates, etc ; it also submits schemes for preventive measures. The Central Board has power to impose a cess upon estates and mining lands in order to meet the cost of carrying out these recommendations.

Sir Malcolm Watson sees in the Health Board Enactment " nothing less than an attempt to wipe malaria out of Malaya," and he concludes that, " we shall press on, assured of great victory." He gave some interesting figures of the cost of anti-malaria work in Malaya. The upkeep of open drains and oiling, in intensely malarial hill land, costs about 30s. per hundred feet per annum. The capital cost of subsoil drainage is heavy in Malaya, but spread over twenty years it is less than one-third of the cost of oiling. " Quinine as a prophylactic has proved a complete failure."

Colonel S. P. JAMES read a short paper on anti-malaria measures for poverty-stricken regions in Europe, and on the recommendations of the Commission appointed by the Health Committee of the League of Nations. As an example of the problem which requires solution, he instanced malaria in Bulgaria, where two million penniless refugees have returned to their own country from Macedonia and elsewhere. He continued as follows : " Now it has to be admitted that, in circumstances of poverty such as those to which I refer, there is not, and perhaps never will be, enough money to apply the methods of malaria

control which have proved effective in certain small and relatively wealthy areas in various parts of the world. No one doubts the efficacy of these measures when they can be thoroughly applied, but everyone agrees that they are difficult and very expensive." Col. James's actual words are given because his position is often misunderstood, and his views are often mis-stated. He pointed out that the Commission have not yet succeeded in finding a simple and cheap method of dealing effectively with the disease in poverty-stricken districts, and that, in the meantime, they recommend that the disease should be controlled, first, by the direct methods of treating the sick, which has robbed the disease of its importance in several European countries, and killing the mosquitoes in houses; and, secondly, by the indirect method of improving the economic and social conditions of the people. The object of "bonification" is "to change a poverty-stricken, sparse, scattered, often semi-nomadic, population into one which is settled and well to do, with proper arrangements for housing, water supply, education and general welfare, and with adequate medical attention. A change of this kind does not eradicate the causes of endemicity and the sources of malaria, but it quickly brings about a cessation of severe and fatal cases and a significant reduction of bad effects, so that the disease comes finally to be of little or no importance as a cause of sickness and death."

Dr. J. W. SCHARFF contributed a paper on the results of mosquito control in the rural areas of Singapore. *A. maculatus* is practically the only carrier of malaria, and the method adopted was its destruction in the larval stage. Paris green was found unsuitable, because: (1) it is difficult to handle in wet weather; (2) its invisibility when dusted on water makes supervision very difficult. Oiling was found to be expensive, supervision was a great tax on the responsible officer, the oil was heavy to carry and "coolies are always on the alert to pour oil in bulk down a drain, to relieve themselves of the unwelcome burden." The method adopted was a campaign of oiling dangerous breeding places within half a mile of each village, followed by a gradual extension of permanent drainage. The result has been "a steady improvement in the prosperity and health of the inhabitants;" in treated villages the spleen rate was reduced from 33 per cent. in 1921, to 5½ per cent. in 1927, while, in untreated control villages, there was no such reduction.

Colonel C. A. GILL expressed the opinion that no one acquainted with the condition in the Punjab during the malaria season could avoid the conclusion that men, money, and material were not available to control malaria by anti-larval measures. It was his experience that wherever poverty and scarcity of food prevailed malaria was hyper-endemic, although mosquitoes were not abnormally abundant. The ten million acres under canal irrigation in the Punjab constitute a vast bonification scheme which has improved the standard of living. In some areas, irrigation has been responsible for water-logging, but the Drainage Board is now engaged in dealing with this, and special attention is also being given to the removal of jungle-growth near human habitations. "Nothing is more striking in the Punjab," he said, "than the absence of relationship between the relative prevalence of anophelines and the local incidence of malaria and nothing is more conspicuous than the relatively high incidence of malaria in association with environmental conditions characterized by relatively high atmospheric humidity"; and measures designed to improve drainage and to prevent flooding, by reason of their influence upon atmospheric humidity, play an important part in reducing malaria.

Dr. C. STRICKLAND, as an illustration of the "species-control" of malaria, recounted the good effects of deliberately planting ribbons of jungle over drains where *A. maculatus* was breeding on a tea estate in Assam.

Colonel KATSUMI MATSUNO, Professor in the Army Medical College at Tokyo, spoke of the malaria in central Japan. Benign tertian is the only type and *A. sinensis* the only carrier. He had seen 735 cases in 20 years.

Colonel W. W. CLEMESHA gave an account of an outbreak of malaria on a healthy tea estate, about 3,000 feet above sea level, in Travancore. This outbreak occurred during the winter months, when the mean temperature is under 70° F. and the night temperature is frequently as low as 50° F. No mosquitoes breed in the neighbourhood at this season, nor would parasites be likely to develop in them if they did so. Colonel Clemesha attributed the outbreak to the presence of infected, hibernating mosquitoes (*A. culicifacies*) in cow-sheds situated near the coolie-lines. He mentioned several instances of attacks of malaria in Europeans which occurred before mosquitoes had become active in the spring, and he concluded that the only satisfactory explanation is that anopheles, some of which were infected during the previous year, awoke to activity early, and succeeded in infecting a number of human beings. Colonel Clemesha described the great difficulty of dealing with malaria on tea estates situated in the plains of Assam. The numerous collections of water, the high ground-water, the many species of anophelines, and the meteorological conditions, all favour malaria. The coolies live in houses built by themselves, scattered about the estates. There are usually many anopheline breeding places on the borders of the estates (such as rice-fields fed by mountain streams) which are not under the control of the management. He considered that a remedy would be the concentration of the labour force in suitable lines in the centre of the estates, but this involves great expense.

Mr. M. O. T. IYENGAR, entomologist to the Bengal Public Health Department, contributed a paper on the epidemiology of malaria in the Lower Bengal Delta in the neighbourhood of Calcutta. This area is flat, but the banks of the many rivers are raised, and between them are depressed areas which form natural basins. Malaria is hyper-endemic in the higher and drier areas near the rivers, but there is very little malaria in the low-lying land between them. The author's explanation is that *A. minimus* (*A. funestus*) breeds in the temporary collections of water left just after the monsoon in the high land, but is prevented from breeding at that season in the low lands because these are flooded. Later on, all the collections of water in the higher lands dry up and *A. minimus* disappears, but in the low lands the floods subside leaving pools in which the anophelines breed. Malaria, however, does not appear in these lowlands because the season is too late for transmission. "The coincidence of the increase of the carrier anopheles with the transmission season marks an endemic area . . . the mere presence or absence of carrier anopheles is of no great material consequence."

Colonel S. P. JAMES, Mr. W. D. NICOL and Mr. P. G. SHUTE, of the British Ministry of Health, have been engaged for several years in preparing batches of infective mosquitoes for therapeutic use in mental diseases. Their practice is to collect about three hundred specimens of *A. maculipennis* in the adult stage, to feed them upon a suitable case daily, and to incubate them at 23° C. for about a fortnight until they become infective. They have found that there is a very high death

rate among the mosquitoes from April to July, and a very low death rate in other months, particularly from August to October. They have also found that the high death rate coincides with the season of maturation of the eggs and oviposition. They conclude that this is the cause of the high mortality, and that "in future, we must endeavour to correlate the seasonal incidence of primary malaria, not with the seasonal prevalence of the mosquito concerned, but with the seasonal prevalence of the individuals which live long enough to be transmitters." [Some of the statements in this paper are made rather ambiguous by a slip in a decimal point.]

Mr. SENIOR WHITE read a paper on the biological control of mosquito breeding. He and others have found that only extremes of pH have any inhibitory effect. In Ceylon, acidity other than that due to CO₂ is definitely prejudicial to breeding. In general, a low oxygen content is unfavourable to most species; in rice-fields there is apparently a close relationship between rise in oxygen content and the entrance into the fields of the carrier species (*A. funestus*). Saline ammonia in higher quantity than 1 part per million inhibits all anophelines other than the *rossi* group. WILLIAMSON considers it probable that the true inhibitory effect is not ammonia *per se*, but the ammonia-nitrate ratio, and Mr. Senior White suggests the insemination of breeding places with bacteriophages which destroy nitrifying organisms.

Professor K. B. WILLIAMSON believed that biological chemistry would throw light on the adaptation of mosquitoes to the water in which they are found, and on the adaptation of malaria parasites to their insect and human hosts. He considered it possible that some bacteria present in putrescent water may generate poisons which inhibit mosquito breeding. Many plants, such as *Euglena*, which grow only where pure-water-breeding mosquitoes are absent, are not themselves the cause of the absence of these mosquitoes, but the waters which suit them happen to be unsuitable for the mosquitoes. The mineral salts present in the water must be considered; in Malaya, *A. maculatus* is present in granitic districts, and *A. karwari* takes its place in streams which flow through a laterite soil. Ferruginous waters are unfitted for anopheline larvae. Saline tolerance is not uncommon among malaria vectors, and *A. crucians* and *A. multicolor* apparently carry malaria only when they breed in salt water. The question arises if the malaria-carrying power of mosquitoes is identical when they are bred from waters of different degrees of purity; the danger of certain species in some countries and their harmlessness in others may be explained on these grounds. Rotting vegetation prevents mosquito breeding in the rice-fields of some Malayan districts, and Professor Williamson considers that "there is the possibility of changing the anopheline fauna by regulating the amount and kind of organic matter in the water . . . species which breed in pure water, and among them at least many efficient vectors, should be the easiest to eradicate by a minimum of rot."

Mr. Bruce MAYNE stated that the inoculation of the contents of the stomach of a single *A. quadrimaculatus*, weighing 3 mgm., was sufficient to cause malaria. He was not able to transmit malaria direct from man to man by feeding mosquitoes on malaria patients and allowing them, immediately, to bite healthy persons, although he was able to find plasmodia in a saline suspension prepared from the macerated proboscis after the first feeding. When he fed infected mosquitoes on sterile dates, active sporozoites were found in suspensions made from the fruit.

Colonel S. R. CHRISTOPHERS expressed the opinion that both accurate splenometry and measured parasite counts (e.g., by Sinton's method, with fowl's corpuscles) are practicable in the field and are essential to the study of malaria. He demonstrated the method, used in India, of estimating the size of enlarged spleens by two measurements, one along a line drawn from the apex of the spleen to the umbilicus, and the other from the apex to the middle line. Tables were given showing the corrections of spleen measurements to be made in children of different ages and sizes. Major COVELL pointed out the advantages of Christophers's method as compared with the old method of measuring from the costal margin.

Dr. S. L. SARKAR gave an account of the development of immunity to malaria among the children of the Chittagong hill-tribes, as shown by the decrease in the size of their spleens after the age of three years, and by the intermittent type of their fever.

Major J. A. SINTON stated that he had come to the conclusion that the adult splenic index in a treated population is no true indication of the amount of uncured malaria; and that cured persons in an untreated population rapidly lose their enlarged spleens in the absence of re-infection. Colonel JAMES agreed that the splenic index was misleading in areas where quinine treatment is practised, and he had found it misleading in countries where malaria has a low endemicity and short seasonal prevalence.

Colonel S. P. JAMES, Mr. W. D. NICOL, and Mr. P. H. SHUTE presented a paper on the treatment of malaria, with special reference to the natural processes and the conditions which, without drug treatment, protect certain individuals from the ordinary symptoms and effects of a malarial infection. They found that about 25 per cent. of the patients who were bitten by mosquitoes carrying sporozoites failed to become infected; in others, the infection remained latent for six months or more before an attack occurred; in yet others, there was an abortive primary attack without discernible parasites in the blood, followed by an obvious attack months later. "At the time of their inoculation some natural process or artificial condition was at work which prevented the development of the malarial infection." Another interesting subject discussed by the authors was the development of immunity to a particular strain of benign tertian parasites, which follows its repeated inoculation. They found that persons thus immunized were readily infected by other strains of benign tertian, but the resulting attack was abortive. "The chief aim of experimental work should be to ascertain how to assist the physiological protective and curative processes which many individuals seemed naturally to possess." Nearly all failures "to take" happened during the winter months; cold weather seems to assist the natural curative processes. Exercise favours relapses. A single dose of 5 grains of quinine, given about the middle of an attack of therapeutic malaria, seems to set in motion some natural process of cure and causes the fever to cease almost at once; but the cure is not complete, for recrudescences occur. A single dose, even of 30 grains, has no effect if given during incubation. A single dose given in the middle of an attack must be as large as 5 grains, or thereabouts, but no better effect is obtained by giving a larger dose such as 10 or 20 grains. A return of fever and parasites within six weeks the authors call a "Recrudescence"; if the interval is longer than six weeks, they call it a "Relapse." Recrudescences are more frequent after relapses than after the primary attack, and it is considered probable that the causation of

relapses and recrudescences is entirely different. The authors conclude that thorough and prolonged quinine treatment is no more effective in preventing a relapse than the single small dose; but they are most emphatic in declaring that these conclusions apply only to the treatment of induced malaria in England, and that "it would be a great error to assume that the results obtained in England would be equally applicable to the treatment of malaria in tropical countries."

Major J. A. SINTON read a paper on the treatment of malaria with drugs. Among over fifteen hundred patients suffering from benign tertian malaria he has not found a single case of quinine resistance, although many of them arrived with histories of having this condition; nor did he see relapses occur during the course of quinine treatment. The best results in the production of a permanent cure in malignant tertian malaria were obtained with quinine and alkali treatment. Fresh infections with *P. vivax* appeared to be more easily cured than chronic ones. The relapse rate in chronic benign tertian malaria was 60 to 70 per cent. Stovarsol and plasmochin caused a rapid disappearance of *P. vivax*. The relapse rate with stovarsol was about the same as that with quinine. The toxicity of plasmochin made it unsuitable in its present form for mass treatment in an uneducated tropical population.

Colonel H. W. ACTON and Colonel R. N. CHOPRA made a communication concerning the action of quinine. Recapitulating former work, they stated that: KING and ACTON showed that when one gram of basic quinine was taken by the mouth, the concentration in the blood did not rise beyond 1 in 150,000. Acton found that quinine base was ten times more powerful at pH 8 than at pH 6. Acton and Chopra showed that the concentration in the blood was higher when alkalies were administered. They also showed that the concentration was greater in the mesenteric than in the peripheral blood vessels, and to this they attributed the good effect of quinine in the treatment of sub-tertian infections. SINTON showed the clinical benefit of giving alkalies with quinine. ACTON, CURGEL and DEWEY, found that though quinine has a powerful action on malaria parasites, it has a marked depressant action on the heart. (Dr. S. L. SARKAR, who has carried out experiments with the cinchona alkaloids under the auspices of the Indian Research Fund, stated, in the discussion on the treatment of malaria, that quinine is the only cinchona alkaloid which has no deleterious effects upon the heart.) The present authors found that cultures of *Paramoecium caudatum*, with a pH of 8 were killed by a concentration of quinine equal to 1 in 35,000; at 1 in 120,000, the multiplication was hindered and this effect was seen in dilutions up to 1 in 250,000. They considered that the sub-lethal concentration in the blood of man paralyses the movements of the young malaria trophozoites on the surface of the red blood cells, so that, being unable to enter the cells, they are swept off by the blood stream and die of starvation within the internal organs.

Dr. K. E. SURBEK, of Sumatra, drew attention to the importance of graduating the dose of quinine according to the weight of the patient. He recommended treatment for two days with sodium cacodylate, alternating with four to six days' treatment with quinine. He had found the administration of tincture of iodine useful in the treatment of enlarged spleens.

Dr. B. SHAHA pointed out that the dangerous lowering of the blood pressure which sometimes follows the intravenous administration of quinine, can be largely avoided by giving the drug in divided doses.

Dr. I. F. DE MELLO had treated several series of patients with the smalarina of Professor Cremonése, a colloidal preparation of mercury and antimony. He found it devoid of action on malaria parasites. Major SINTON's experience of the drug was the same.

Dr. K. MORISHITA stated that all the residents in Formosa were compelled by law to undergo a monthly blood examination for malaria, and that the positive cases were treated with quinine. The parasite rate was only 2 or 3 per cent., but it had been the same for about ten years, and he did not consider that the method had been wholly successful. This he attributed to the missing of latent cases, and to lack of supervision in the administration of the quinine. He suggested that, as all latent cases give a positive urobilinogen test, all persons with a positive reaction should be treated with quinine.

MM. TRUONG-DINH-TRI, and TRINH-HUU-LOI of Tonkin, recommended the injection of strychnine for the purpose of provoking attacks in the detection of latent malaria.

The following Resolutions on Malaria were passed by the Congress :—

Resolution I.

" The Malaria Section of the Seventh Congress of the Far Eastern Association of Tropical Medicine are aware of many instances of a great increase in the incidence of malaria caused by the facilities given to mosquito reproduction by engineering works, either during construction or afterwards, due to the different conditions brought about. This Congress is of the opinion that plans for railways, canals, harbours and all similar engineering works likely to affect the conditions producing malaria should be submitted to the proper public health authorities and their sanitary engineers before being sanctioned by Governments.

Resolution II.

" As it has been represented that differences of opinion regarding the best method of controlling malaria sometimes cause doubt in the public mind and so may hamper the progress of anti-malarial work, this Congress takes the present opportunity to emphasize the fact that there is no single method of malaria control applicable to all conditions and all countries.

" Nevertheless, they consider that for towns, mines, plantations, large public works and similar aggregations of people, the control of the breeding-places of the malaria-carrying species of mosquito is a method which should be employed whatever other anti-malarial measures are put into force. Whenever possible this control should be effected by permanent works which eliminate entirely the sources of mosquito breeding.

" For wide rural areas, specially those with scanty, poverty-stricken populations, the first step in the control of malaria is adequate research, so that the conditions present may be ascertained and the best methods of control under the particular circumstances ascertained as a result of such research. Methods of prevention may here be of great variety and include drainage, flooding, jungle clearing, jungle preservation, bonification, the promotion of agriculture, improvement of housing and the general economic condition, education, etc., of the people. The systematic killing of infected adult mosquitoes, screening, the use of anti-malarial drugs and a host of special methods have each also to be considered in their proper application. The Congress desires to stress the need not only of thoroughly trained malaria research officers, but of expert malarial engineers in whichever type of malaria prevention is at stake."

W. Fletcher.

UNITED FRUIT COMPANY, BOSTON, MASS. SEVENTEENTH ANNUAL REPORT. MEDICAL DEPARTMENT. 1928. Section II: pp. 34-123. With 2 graphs. [2 refs.] [Malaria.]

The main interest of the section of this report, which deals with malaria, centres in the accounts of an attempt to destroy the gametocytes in the blood of the population by the administration of plasmoquin on a large scale, and so to control malaria by rendering the infection of mosquitoes impossible. As the result of their investigations in the Panama division of the United Fruit Company, which have been reviewed already in this *Bulletin* (Vol. 26, p. 939), BARBER, KOMP, and NEWMAN came to the conclusion that a very small dose of plasmoquin compound, consisting of 0.01 gram of plasmoquin and 0.125 gram of quinine, would prevent mosquito infection; and Dr. Otto BROSIUS reports that, during 1928, mosquito control was almost entirely disregarded in order to test the value of the gamete-destroying power of plasmoquin compound as a sanitary agent; for, as he writes, "much should be expected from treatment alone, assuming that quinine destroys the asexual parasites and plasmoquin the gametes." A complete survey was made of the camps and farms on the Panama Division, after which all those persons whose blood contained malaria parasites were subjected to treatment. The daily dose was 0.06 gram of plasmoquin and 1.75 grams (27 grains) of quinine. The patients were given 4 days' treatment to take at home; on the fifth day, their blood was re-examined and an additional four days' treatment was supplied; finally, they were instructed to take "tonic tablets," containing quinine, arsenic, and iron, for eight days more. The number of persons examined in the preliminary survey was 3,765; 477, or 12.67 per cent., of them were found positive, but only 375 received a complete course of treatment. None showed evidence of intoxication attributable to the drug. A second survey was made a few months later in order to estimate the effect of the treatment in reducing the amount of malaria; the result was disappointing: 2,176 persons were examined and 314, or 14.43 per cent., were found positive, an increase of 1.76 on the percentage found positive before treatment. A third survey was made later by Dr. Barber and his colleagues with results which were even more disappointing, for the rate of infection showed a still further increase, and of 1,045 persons examined, 22.48 per cent. were found to be infected with malaria parasites.* In view of

* The author calls this "a crucial test" of plasmoquin and quinine as "a sole sanitary agent" and their failure in this respect is implied. The so-called test is far from satisfactory. First, there is no evidence that the 314 found positive at the second examination and the 235 at the third were new infections; they may well have been really positive at the earlier examinations or they may not have been examined before. Out of 5,941 persons examined in the first and second surveys only 1,387 persons were known to have been examined at both. Secondly, even if it be granted that they were new infections, they provide little support for the view that the plasmoquin and quinine failed. Such a view assumes that all, or at least most, of the sources of infection were submitted to the drugs under test. But nearly a quarter of the positives received partial treatment or none, and the author himself subscribes to the view that blood examination only reveals about half the true infestation rate, so that many other infected and potentially infective persons must have escaped treatment.

It is to be noted too that the populations examined in the three surveys were by no means the same, the numbers examined at each farm or camp differing widely from one survey to the next in many instances, and the three surveys were done at different seasons of the year.

There is some evidence that plasmoquin (as given) does not always sterilize in the fact that 33 positives treated after the first survey were positives at the second.

J. F. C. H.

the failure of treatment as the sole anti-malarial measure, strenuous efforts are now being made to inhibit the breeding of anophelines near towns and camps, and to destroy adult mosquitoes in the houses. In addition, mass, or "blanket," treatment with plasmoquin and quinine is being carried out, but it is impossible to treat everyone because there is no way of compelling the people to accept treatment. [This appears to be an insuperable obstacle to the sterilizing of populations by means of drugs. It will be noted that only about four-fifths of the infected persons on the Panama Division completed the full course of treatment, and the fact that none of them showed any toxic symptoms makes it appear doubtful if the full doses were taken by all those who were supposed to have done so.]

Patients in hospital were successfully treated with plasmoquin and quinine; Dr. Wilhelm CORDES treated all the malaria patients admitted to the Company's hospital at Preston, Cuba, with 0.04 gram of plasmoquin and 1.8 grams of quinine daily. He considers that plasmoquin is not to be compared with quinine as a clinical remedy, and that as "the importance of plasmoquin lies almost exclusively in its effects on the sexual forms of the parasites, its routine use should be considered for prophylactic rather than for curative purposes."

The Report contains many other papers of interest, among which are the following: Dr. W. E. DEEKS, the general manager of the Medical Department, reviews the methods of malaria control which have been adopted, and sets out the results. He points out that "to attempt to control malaria by the prevention of mosquito breeding alone, in the extensive areas under cultivation (over 7,000 square miles), even if practicable, would involve expenditure that no commercial organization would sanction." The chief measures adopted on the Company's plantations are "a short-radius control," or anti-larval measures around habitations; agricultural drainage by canals known as "drag-line ditches"; whitewashing the interiors of the houses, and destroying the adult mosquitoes within them; the screening of certain houses; treatment with plasmoquin and quinine. Dr. DEEKS gives the following figures as the results: In 1925, the malaria rate per 1,000 employees was 239; in 1926, it was 211; in 1927, it was 147; and in 1928, it was 100.

Dr. Manuel ROJAS reports on the treatment of pernicious malaria, accompanied by coma or convulsions, in the hospital at Limon, Costa Rica. It consists of intravenous injections of 1 gram of quinine bihydrochloride dissolved in 10 cc. of normal salt solution. Three minutes is occupied in giving each of the injections, they are administered twice a day for two or three days, or until the patient is able to take plasmoquin and quinine by the mouth.

Dr. THONNARD-NEUMANN administered 5 to 8 cc. of blood, containing subtertian parasites, to a series of six West Indian negroes who were suffering from diseases of the nervous system. In four cases, the malaria ran its course without fever; in two cases, there was a febrile reaction which lasted only 2 or 3 days; and, in all but one, the parasites showed a tendency to disappear spontaneously. The Editor of the Annual Report concludes that the negro race has apparently developed a high tolerance to malarial infection.

The Report contains a progress report by Dr. Eugene WHITMORE who is investigating blackwater fever. Laboratory tests were made in blackwater fever cases, in cases of malaria in blackwater subjects,

and in controls suffering from malaria. The following are the results : (a) The Kahn test for syphilis was not more often positive in thirteen cases of blackwater than it was in the controls. (b) There was no alteration of the coagulation time. (c) Resistance to hypotonic salt solution, saponin, and cobra venom was unaltered. (d) The serum of the blackwater patients showed no difference from the serum of the controls in its action on the patient's red cells, or on normal cells. (e) There was no indication that quinine bihydrochloride, in a dilution of 1 in 2,000, exerted any haemolytic action, either in mixtures of serum and red cells, or in mixtures of red cells and salt solution. In two convalescent cases, 0.2 cc. of a 1 in 1,000 solution of quinine were injected intradermally without causing any reaction. (f) The alkali reserve was measured in two cases, with the result that a slight degree of acidosis was found in both of them, but it was not more than that which is sometimes found in the routine examination of medical students in Washington. Dr. WHITMORE reviewed the sarcolactic acid hypothesis of BLACKLOCK and MACDONALD, and concluded that if acidosis is a factor in the production of haemolysis, it can only be additional to some other specific factor, since by no means all cases of excessive exercise (in which the lactic acid in the blood may be increased nine-fold), or of acidosis, no matter how severe, suffer from haemoglobinaemia or haemoglobinuria.

Under the heading of Malaria Parasite Surveys, Dr. BARBER, Mr. W. H. KOMP, and Mr. B. M. NEWMAN, of the Public Health Service, draw attention to the inadequacy of conclusions based on a single survey (see also IYENGAR, in this issue). In one of the Panama camps they found 46 per cent. of the inhabitants positive for parasites ; but when they made a second survey 19 days later, they found that positives were as numerous among those who were previously negative as among those who were previously positive. They concluded that when a single survey gives as high a rate as 46 per cent. it may be fairly presumed that all, or nearly all, of the population, is infected. Their investigations of the breeding places of *A. albimanus* (the chief carrier in Central America) convinced them that it is capable of adapting itself to a great variety of breeding-places which vary with changes in the weather. They found that the favourite breeding-places were collections of fresh or brackish water, open to the sun and not fouled by much decaying vegetation. In wet weather, they discovered it breeding in grassy depressions in the meadows, in ditches, in pools, and in animal tracks. They caught large numbers of adults in the houses of the labourers, and they emphasize the value of the adult anopheline index in assaying the value of antilarval measures.

W. F.

INDIAN MEDICAL GAZETTE. 1929. Oct. Vol. 64. No. 10. pp. 573-577.—**The Parasitology of Indian Malaria : Unpublished Information** [R. K.]

Major SINTON, the director of the Malaria Survey of India, has recently compiled a "Bibliography of Malaria in India" as the result of two years' search into the archives of various government departments. This will shortly be issued as the first number of a new publication entitled "Records of the Malaria Survey of India" [see below]. The editor of the *Indian Medical Gazette*, Colonel KNOWLES, has scrutinized most of the documents catalogued in the Bibliography ; "the informa-

tion which they contain covers India from north to south, and east to west, and constitutes a mine of entirely untapped information with regard to the epidemiology of Indian malaria." Only 15 per cent. of the catalogued papers have been published in journals, and 70 per cent. have never been printed. One of the many examples given is a report which exists only in manuscript form, by Lieut.-Col. H. STOTT, I.M.S. on a two years' survey of the Tochi Valley, dealing with malaria in a barren, mountainous country. It is very fully mapped and illustrated with magnificent photographs. "The outside world may think that malaria has been but little studied in India since Sir Ronald Ross . . . but the true facts are entirely different . . . The Malaria Commission of the League of Nations is at present touring India . . . We believe that they will be amazed at the amount of anti-malarial work and organization that is going on all over India; . . . probably there is more investigation of malaria going on in this country than in any other in the world, when the funds available are considered." Col. KNOWLES is about to publish the parasitological information which he has gleaned from these unpublished papers; "but there is a whole wealth of general epidemiological information in these reports which should be surveyed, edited and published." Col. KNOWLES mentions, incidentally, that there is an admirably conducted class for malariologists at Kurnal, under the auspices of the Malaria Survey of India, where he thinks that they can be much better trained for the work of the country than in England.

W. F.

SINTON (J. A.). **A Bibliography of Malaria in India.**—*Records of the Malaria Survey of India.* 1929. Oct. Vol. 1. No. 1. pp. 1-200. Calcutta: Thacker, Spink & Co. [Rs. 7-12 or 10s. 4d.]

Volume 1, No. 1 of the *Records of the Malaria Survey of India*, recently issued by the Indian Research Fund Association, consists of the "Bibliography of Malaria in India," referred to in the preceding summary. Major J. A. Sinton, the compiler, states that he originally intended only to gather together as many references as possible to the work done on malaria in India, but that, because of their close connexion with malaria, he has included also references to blackwater fever, and to works dealing with the Anopheline mosquito. Besides making systematic search for references in better known journals published mainly within the last 30 years, Major Sinton has paid especial attention to the valuable observations on malaria which lie hidden away in local and provincial publications in India and to the many manuscript reports buried in the files of various offices of which the ordinary worker has no cognizance. The bibliography is divided into five parts. Part 1 gives references to books and papers in journals; Part 2 refers to published and manuscript reports prepared for the Central and Provincial Governments of India, and to military and other reports; and Parts 3 to 5 form full subject, authors, and geographical indices to the 2,200 or more references given in Parts 1 and 2. The 42-page subject index which forms Part 3 is indeed far more than a simple index based on the titles of the various papers listed in Parts 1 and 2. It is an attempt to index in some detail the principal points dealt with in the actual texts of the papers. The section dealing with drug treatment, for example, has been divided up under 43 sub-heads, such as "Adrenalin," "Alkalies," "A-malariin," "Amylopsin," "Antimony,"

"Arsenic," etc., while under the Quinine entry, which itself covers three and a half pages, are given 42 sub-divisions such as "Absorption of," "Action on malaria parasites," "Adulteration," "Administration, methods of," "Blood concentration of," "Cost of," "Deterioration of," "Distribution of," and so on. The Bibliography should be invaluable to all who are concerned with malaria problems, and particularly to those engaged in malaria work in India.

R. L. S.

SUR (S. N.) & GHOSH (Banamali). **A Malaria Survey of Madarihat and its Environs.**—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. pp. 558-561. With 1 sketch map.

The object of this paper is to show the importance of a mosquito survey before launching a scheme to reduce malaria :—

In order to improve the health of the small town of Madarihat it was proposed to connect all the borrow pits along the railway line and drain them into the nearest river. A timely survey made by the authors showed that no dangerous mosquitoes bred in the pits, but that the source of the malaria lay in the old bed of a diverted river where they discovered *A. culicifacies*, *A. listoni*, and *A. maculatus*.

W. F.

JAMES (S. P.). **Remarks on Malaria in Kenya.**—*Kenya & East African Med. Jl.* 1929. July. Vol. 6. No. 4. pp. 92-98.

Col. S. P. JAMES has recently completed a malaria survey of Kenya, and during his stay in that country, he addressed the local branch of the B.M.A. on the subject. Malaria has increased with the opening of the country, as it usually increases under such changing conditions and as it sometimes increases even during the process of bonification. In this connexion, the Chairman reminded members of the Association that, about twenty years ago, Sir Frederick TREVES wrote in one of his books ("A Holiday in Uganda") that there was no malaria in Nairobi. All this is changed now, and Col. James said in his lecture that, to-day, "there is a high incidence of endemic malaria in Kenya as a whole, and the risk to European and other immigrants is serious." He emphasized the view that malaria is a house disease; in England, malaria affected certain houses which, being damp and uncared for, afforded shelter to mosquitoes, and it affected certain families who were so careless that they neglected their homes, did not object to being bitten by parasites, and took no precautions. He gave an illustration of similar conditions among white settlers in Kenya, where he found a farmer, his family, and all his labour-force, infected with malaria. His house had a thatched roof, wattle-and-daub walls, and a mud floor, and 5 out of 38 anopheles caught in it were carrying sporozoites. As a means of dealing with malaria in the native reserves, Col. James recommended methods of bonification which would improve social conditions by the introduction of agricultural and industrial welfare schemes.

With reference to the prophylactic value of quinine, it had been found negligible in artificially induced malaria in England. He thought that the more satisfactory results obtained in the prophylactic treatment of bird malaria were due to the conveyance of the infection by means of

the inoculation of blood containing schizonts, whereas, in the human experiments, which he had conducted in England, sporozoites (which are tissue parasites) were inoculated by the bites of mosquitoes. He said that nevertheless he did not like it to be thought that he held the opinion that prophylactic quinine was useless. The subject was difficult, and the only sure knowledge was that quinine would not prevent infection, though it might prevent clinical attacks while it was being taken. The infected person who continued quinine regularly was subject to slight rises of temperature and periods of indisposition which represented suppressed attacks, and if he neglected the daily dose he went down with a true clinical attack within 2 or 3 days. A person taking prophylactic quinine was also liable to an attack if he were obliged to undergo hardship or exposure. Although it was not entirely satisfactory, it had to be used in certain cases; for example, for troops in the field who had to be kept fit to carry on their duties during a limited period. Whether it should be used by settlers on farms in Kenya could only be decided for individual cases. "It is not a method," he concluded, "for which a general rule is applicable."

W. F.

GARNHAM (P. C. C.). **Malaria in Kisumu, Kenya Colony.**—*Jl. Trop. Med. & Hyg.* 1929. Aug. 1 & 15. Vol. 32. Nos. 15 & 16. pp. 207-216; 221-231. With 12 text figs. [45 refs.]

Kisumu is a town of over 7,000 inhabitants, 150 of whom are Europeans, situated at the terminus of the Kenya and Uganda Railway, on a small hill nearly 4,000 feet above sea level, overlooking the Victoria Nyanza. There is a constantly high rate of sickness due to malaria, chiefly subtertian; about 200 patients are treated every month, and there are occasional cases of blackwater fever among the European and Indian sections of the inhabitants. This endemic malaria the author attributes to *A. funestus* which is almost always present in such numbers that an increase in its density has no appreciable effect on the malaria curve. Epidemic malaria occurs after the long spring rains, and is attributed to *A. costalis* which appears at that season in great numbers. The spleen rate was found to be an unsatisfactory measure of the amount of malaria in Kisumu; the parasite rate in children between 4 and 10 years old was nearly four times as high as the spleen rate. The species of anopheles found in the district were: *A. gambiae* (*costalis*), *A. funestus*, *A. pharoensis*, *A. mauritanus*, *A. pretoriensis*, *A. squamosus*, *A. maculipalpis* and *A. symesi* Edwards, a new species found by the author. *A. costalis* was found breeding "in everything and everywhere" in crowded parts of the town and in secluded harbours, preferably in stagnant water. *A. funestus* was found to be fastidious in its choice of breeding-places which were limited to streams overgrown with weeds, to drains, and to papyrus-swamps, away from the town; its larvae were as difficult to find as those of *A. costalis* were easy. Twenty-five huts were examined for mosquitoes every week, from March, 1926 to January, 1928. Almost the only anopheles caught were *A. funestus* and *A. costalis*; *A. funestus* was in the majority except after the long rains. Its density did not vary with the rainfall, because it bred in permanent water; its density was greatest in the huts near

to these permanent breeding places. *A. costalis* was present in greatest numbers after the long rains which filled up and multiplied the casual collections of water in which it bred. As these temporary breeding places were to be found everywhere in the neighbourhood of the huts, the density of *A. costalis* was not related to the distance from the swamps and streams. The habits of the adult *funestus* and *costalis* were similar; they did not appear to leave the huts immediately after feeding; more than 300 *funestus* were frequently collected in a single hut in the daytime and much the same number at night. Female anopheles were found to abandon huts which had been vacated by their human occupants, but the number of male mosquitoes was actually increased. The author was unable to catch anopheles sheltering in the trees and bushes near the breeding-grounds. He concludes that the enormous permanent breeding grounds in the neighbourhood of Kisumu render the eradication of malaria impracticable, and he recommends the treatment of cases and carriers, "the deflection or elimination of the domestic anopheline adult, and, lastly, and leastly, anti-larval measures."

W. F.

DURIEUX (C.) & SALL (M.). Nouvelles recherches sur l'index du paludisme à Dakar durant la saison fraîche. [**A New Inquiry into the Malarial Index at Dakar, during the Cold Season.**].—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 618–622. [4 refs.] [Pasteur Inst., Dakar.]

The authors examined 153 children between 2 and 15 years of age, in a village on the outskirts of Dakar, during January, 1929. Parasites were found in 24 per cent. At a previous examination, made eight years before, the rate of infection was 50 per cent. The improvement is attributed to the anti-mosquito measures undertaken in connexion with the campaign against yellow fever at Dakar.

W. F.

WALRAVENS (P.). La malaria à Elisabethville. Conditions de la lutte contre la maladie. [**Malaria at Elisabethville. The Conditions of the Campaign against the Disease.**].—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 197–202. With 1 plan. [Bact. Lab., Elisabethville.]

There are many species of anopheles in the neighbourhood of Elisabethville, but only two, *A. costalis* and *A. funestus*, are commonly found in the town; *A. costalis* predominates, and of 544 anopheles caught in houses, 89 per cent. were *A. costalis* and 11 per cent. *A. funestus*. *A. costalis* breeds almost anywhere, in river pools where the flow is retarded, in the edges of streams, in ditches, and in small collections of muddy water; it generally prefers places which are exposed to the sun. The breeding places of *A. funestus* were not discovered (See GARNHAM, above.) The reservoirs of infection are the native children, in 90 per cent. of whom parasites were found at a single examination.

W. F.

BOYD (Mark F.) & ARIS (F. W.). **A Malaria Survey of the Island of Jamaica, B.W.I.**—*Amer. Jl. Trop. Med.* 1929. Sept. Vol. 9. No. 5. pp. 309–399. With 13 figs., 10 maps, 7 charts & 2 plates. [19 refs.]

Endemic malaria in Jamaica is almost entirely confined to the very fertile coastal plains where agriculture is most successful. The bulk of this fertile land is the property of large estates. The settled population is small; most of the labourers come from the plateau of the interior, and they are very susceptible to malaria. In the coastal region there are several foci where malaria is always intense and does not vary; but in the surrounding country there is not much malaria except when there is a heavy rainfall which provides numerous breeding places. Twenty years ago there was much more malaria than there is to-day; 60 years ago there was as little as there is now, and there appear to be cycles of malarial intensity which accompany cycles of rainfall. *A. albimanus* is regarded by the authors as the important carrier. *A. crucians* and *A. vestitipennis* may act as carriers, but they are too scarce to be important. *A. grabhami*, which also occurs on the island, is exonerated because its distribution is much wider than that of malaria and it is prevalent over the island plateau where there is no fever. W. F.

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1928** [HOFLIN (J. W.)].—12 pp. 1929. Kuala Lumpur.

Several interesting questions are dealt with in this report. The malaria of rice fields has been under investigation for several years, and a new sub-committee which was appointed to go into the matter reported that as this was part of the general problem of malaria in the country it was useless to persist in a separate study of the rice fields, and that the malaria of the rice fields in the hilly districts was so largely due to *A. maculatus* that the problem was inseparable from the general one of the malaria of hilly districts.

Reports on larvicidal oils obtained from scrap rubber were considered and the Board came to the conclusion that they were less efficient and more costly than the mineral oil mixtures already in use. Reports from the Institute for Medical Research on the uselessness of aseplene and the value of plasmoquine were considered [see this *Bulletin*, Vol. 26, pp. 380 & 931] and it was agreed that the Government should be approached with a view to preventing the advertising and sale of such drugs as aseplene.

The Board agreed that systematic investigation of the seasonal pathogenicity of anophelines was desirable, in view of the fact that it had been brought to their notice that at times it was difficult to infect *A. maculatus*, the principal local carrier.

In connexion with a proposal to screen the wards of hospitals, the Entomologist described experiments and reported that 25 per cent. of the anophelines used passed through a gauge of 12 meshes to the inch, and 6 per cent. through one of 14 meshes. He recommended that nothing larger than 16 mesh should be used.

The question of damage done to growing rice by oil used as a larvicide was considered. In one district, where oiling was alleged to have injured padi, parasites were discovered in the plants, and it was uncertain whether the damage was due to the oil or to the parasites. The matter is under investigation. (See this *Bulletin*, Vol. 26, p. 909.) Damage done to fish by oiling.)

W. F.

FEDERATED MALAY STATES. **Annual Report of the Malaria Research Division for the Year 1928** [GREEN (R.)].—*Federated Malay States Ann. Rep. Med. Dept. for Year 1928*. Appendix V. pp. 75-85.

This report deals principally with quinine, plasmoquin and time-plasmin in the treatment of malaria. These investigations have formed the subject of Bulletins issued by the Institute for Medical Research at Kuala Lumpur which have been reviewed already in this *Bulletin*. A substance widely advertised, under the name of aseplene, as a cure for malaria, was tried on ten cases, but no evidence was obtained to show that it had any effect on the parasites. There are several other items of interest in the report: (1) The glucose tolerance was investigated in 21 cases of malaria; it was found to be lower than normal in 16 of the cases, but there was no glycosuria in any of them. The urinary diastatic index and the faecal fats were normal in all. (2) *P. falciparum* was cultivated from three cases, but there was no evidence of a second generation arising from merozoites entering corpuscles, though ring-forms developed up to the stage of schizogony. (3) It was found that when 5 grains of quinine hydrochloride were administered in powder form to three healthy men, Mayer's reaction became positive in 40 minutes, and continued so for 10 hours; but when quinine alkaloid, quinine ethyl carbonate, or cinchonine were given, the reaction took three or four times as long to appear and its duration was no longer. (4) In staining blood films, it was found that better results were obtained with Leishman's stain when the distilled water was adjusted to a pH of 7.2 by the addition of 0.1 per cent. potassium carbonate.

W. F.

TERDSCHANIAN (A.). Die Malaria in Dagestan. [**Malaria in Daghestan.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 587-592. [4 refs.]

The Republic of Daghestan lies in the eastern part of the Caucasus. Many biting insects are met with everywhere; in the open, 1 Anopheles to 10-15 Culex, and in rooms, 1 Anopheles to 2-3 Culex were observed. The anopheles were *A. maculipennis* Mg., *Hircanus* var. *pseudopictus* Grassi, *sacharovi* Fawc. and *algeriensis* Theob. In addition to anopheles, sandflies were specially abundant in Tschir-Yurt, the species being *P. papatasi* Scopoli, and *pernicius* Newstead. The malarial indices are throughout high. The author considers that the Republic of Daghestan is heavily infected with malaria. The conditions responsible for it are: the flooding by the large rivers in the northern and central portions of the country; the primitive artificial irrigation in the south, which, when the air temperature is suitable, leads to the development of huge numbers of Anopheles; and also the ignorance and poverty of the population, with the complete absence of prophylactic measures.

E. D. W. Greig.

MARCHOUX (E.). Prophylaxie du paludisme. Le paludisme dans les Dombes et en Camargue. [**The Prevention of Malaria. Malaria in the Dombes and in Camargue.**]—*Rev. d'Hyg. et de Méd. Préventive*. 1929. Oct. Vol. 51. No. 10. pp. 721-744. With 2 maps. [1 ref.]

The region of the Dombes is a hilly plateau with basin-like valleys between the hills; for the last 700 years it has been the custom to dam

these valleys and convert them into fishponds or *étangs*. In olden days, 90 per cent. of these *étangs* belonged either to the clergy or to the nobles; the rest of the country was barren and the inhabitants lived in dire want. Several municipalities reported, in 1790, that the condition of the people was most wretched; they stated that the deaths exceeded the births in number, and they attributed the unhealthiness of the district to the malign influence of the *étangs*. The ravages of malaria were particularly severe in the early part of the nineteenth century, and, in 1857 two-thirds of the population were affected. Between 1863 and 1870 the total area of the *étangs* was reduced from 14,000 to 8,000 hectares and, by their drainage, large tracts of most fertile land were made available for agriculture. Subsequently the social condition and the health of the people improved enormously, and, between 1880 and 1890, malaria came to an end. In 1901 legal sanction was sought and obtained to construct new *étangs*, and they were extended until they covered almost as much ground as they had occupied in the days when malaria was prevalent; but the disease did not return. The *étangs* which used to bring disease now bring wealth and health, for they are a source of great revenue. They are used as fish ponds for two years; at the end of each year the water is run off and the fish are sold at a large profit. In the third year they are drained and cultivated, and they yield huge crops. The people are now well-to-do, they have many cattle (which are the normal hosts of the anopheles), plenty of agricultural machinery, and they live in comfort. In spite of the old, ill-lighted houses, in spite of an abundance of anopheles (*A. maculipennis*), and in spite of some malaria carriers, there is no spread of the disease. This is attributed by Professor Marchoux to the improvement in the lot of the people which has followed the improvement in agriculture, to their increased resistance due to better food, and also to the greater care which they take of themselves.

In the Camargue, near the mouth of the Rhone, there are also *étangs*. There are not so many anopheles in this district as in the Dombes, yet here benign tertian malaria is prevalent. The district consists of large estates, many of which belong to absentee landlords; the farm workers are imported foreign labourers employed by contractors. These labourers live under bad conditions, they sleep in cow-sheds and stables, or wherever they can find shelter; moreover, they are ignorant and suspicious, and they take no care of their health. Professor Marchoux believes that better methods of agriculture and an extension of cultivation would improve social conditions and banish malaria from the Camargue as they have already banished it from the Dombes. [See also this *Bulletin*, Vol. 24, pp. 345-8.]

W. F.

PECORI (G.) & ESCALAR (G.). *Relazione sulla campagna antimalarica dell'anno 1928. (Report on Malarial Prophylaxis Campaign of 1928.)* —*Riv. di Malariologia*. 1929. Sept.-Oct. Vol. 8. No. 5. pp. 481-533. With 3 figs. [English summary p. 633.]

During 1928, endemic malaria in Rome and its environments was a little less severe than in the previous year. In all there were 2,373 cases, 62 less than in 1927. Malignant tertian accounted for 1,057 of these, 423 being primary attacks, 631 relapse cases. Of benign tertian there were 1,284; 493 primary, 791 relapse; of quartan there were only 32, 19 being primary. The population is stated to be about 70,000, which

would give a morbidity rate of 3.39 per cent. The peak of primary benign tertian was in July and August, with 110 and 119 cases respectively; most relapse cases (163) occurred in July. As regards primary malignant tertian the peak occurred in August (134 cases), while relapses (117) were most numerous in September.

Antilarval measures were undertaken in 20 districts. In Ostia Antica, between January 1st and December 31st, 32,807 mosquitoes were captured, 914 of them males; 30,699 were caught in the stables and pigsties, 2,108 in the houses.

H. Harold Scott.

FALLERONI (Domenico). Discussione sulla zooprofilassi. Norme per le costruzioni rurali in zone malariche. Nota sesta. (**Discussion on Zooprophylaxis. Principles for constructing Rural Buildings in Malarial Regions.**)—*Riv. di Malariologia*. 1929. Sept.-Oct. Vol. 8. No. 5. pp. 590-606. With 6 text figs. [4 refs.] [English summary p. 634.]

This article does not lend itself to abstraction. It is one for veterinary architects to ponder over. The author shows that the interposition of stables and piggeries between the source of the mosquitoes and an inhabited dwelling affords a very effective screen provided there is no direct line from the stables to the house and that the distance between them is at least 10 metres. Various plans are depicted to show the principles of construction of such "animal houses" to utilize the attraction of the latter and intercept the mosquitoes before they invade the human dwelling.

H. Harold Scott.

SWELLENGREBEL (N. H.). La dissociation des fonctions sexuelles et nutritives (dissociation gono-trophique) d'*Anopheles maculipennis* comme cause du paludisme dans les Pays-Bas et ses rapports avec "l'infection domiciliaire." [**The Dissociation of the Sexual and Nutritive Functions—"Gono-trophic Dissociation"—in *A. maculipennis* as the Cause of Malaria in the Low Countries, and its Connection with "House Infection."**—*Ann. Inst. Pasteur*. 1929. Oct. Vol. 43. No. 10. pp. 1370-1389. With 4 text figs. [28 refs.] [Inst. of Trop. Hyg., Amsterdam.]

The theory of "house infection" represents the house as the principal centre of infection, and the practical methods of prevention which it teaches are the destruction of all the mosquitoes which can be found within the houses and the construction of houses unsuitable for their concealment. Many authorities deny the truth of this theory and affirm that the mosquitoes leave the houses when they have fed, or at any rate long before they become infective. The author believes that a study of malaria in the Low Countries shows that, under certain conditions, there is a force which keeps the mosquitoes "fixed" in houses over long periods. In the malarious parts of the Low Countries there is only one anopheles in a house for every 200 in cow-sheds. An anopheles which becomes infected in a house during the summer must leave it, at the latest within a few days, in order to lay its eggs; that is to say long before it becomes infective, and the chances that it will find its way back to a house again are less than 1 in 200. It is not surprising therefore that a search for infected mosquitoes, made in the summer,

was unsuccessful except for a few in the earliest stages of oöcyst formation, and it appears strange that malaria can exist under such conditions.

The author's explanation is as follows:—A great change takes place in the habits of the mosquitoes when the autumn comes; egg-laying ceases, and as they no longer wish to leave the houses "fixation" occurs. Though they have stopped laying they do not stop feeding, but continue to bite for several months. The "fixation" increases the numbers of mosquitoes within the houses, because, though they continue to enter, there is nothing to induce them to go out again. The female mosquitoes in the houses do not attain their greatest number until October, when the males have disappeared and there are no larvae left in the breeding-places. During fixation, the parasites within infected mosquitoes become sporozoites and these are inoculated into fresh hosts when the mosquito feeds. In spite of this, hardly a case of malaria occurs in the autumn; notwithstanding their infection, the bites of the mosquitoes appear to be sterile. But this is not really the case, for the malaria declares itself in the spring after an incubation of six to nine months. (See JAMES, NICOL, and SHUTE above, p. 183.) This explains why the yearly outbreak of benign tertian malaria in the Low Countries reaches its height at the period of minimum anopheline density which occurs in April, about four months before the maximal frequency of infected anophelines.

The author considers that the continuation of blood-sucking by mosquitoes when they have ceased laying is a most important factor in the epidemiology of malaria. This he calls "Gono-trophic Dissociation." Malaria in the Low Countries is limited to certain districts; other districts where breeding-places are as numerous remain free, although there are four to six times as many anopheles "fixed" in the houses in the autumn. This freedom is ascribed to "Gono-trophic Concordance"; that is to say, the mosquitoes in these non-malarious places cease to suck blood when they cease to lay eggs. In places where the mosquitoes show gono-trophic concordance, there is no malaria even if the anopheline density is very high. The author does not minimize the importance of cow-sheds; without them, the infected mosquitoes which leave houses to lay their eggs would return again to houses for food and would infect the inmates. Cow-sheds, nevertheless, are powerless to prevent the autumnal transmission, which is absent only under the conditions of gono-trophic concordance.

The anopheles with gono-trophic dissociation show certain morphological differences from those with gono-trophic concordance; the average length of their wings is less and the average number of their maxillary teeth is greater. Moreover, only 2 to 10 per cent. of them show hypertrophy of the fatty bodies, while 70 to 90 per cent. of the group with gono-trophic concordance have this hypertrophy.

The author thinks that gono-trophic dissociation, or some analogous condition, may play an important part in countries beyond the temperate zones, and suggests that it may influence the seasonal incidence of malaria.

W. F.

MURPHY (R. A.) *Microscopic Diagnosis of Malaria on a Group of Tea Estates.*—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. pp. 557–558.

Dr. Murphy is in charge of a group of tea estates in South Sylhet, Assam, in most of which the spleen rate is about 80 per cent.; 61 per

cent. of the malaria is due to *P. falciparum*. The effects of this high rate of infection are much less severe than would be expected; in the last seven years there has been no case of blackwater among the members of the European staff, and the general death rate among the coolies is only 12 to 15 per cent. "The coolies are for the most part old settlers, well acclimatized, and must possess considerable immunity." The author finds that a short course of quinine is "ineffective and does not bear out the results of experiments in a temperate climate." In order to test the accuracy of the malaria returns sent in by the sub-assistant surgeons from the tea gardens, instructions were issued to them that blood-films should be taken from all patients showing a rise of temperature, whatever their complaint. The results of the examinations of the films were then compared with the diagnoses. "The figures from one estate, with a sub-assistant surgeon rather above the average, show how fallacious returns are":—

<i>Diagnosed malaria, and parasites found</i>	...	...	...	380
<i>Diagnosed malaria, and no parasites found</i>	...	...	...	200
<i>Diagnosed as other diseases, and parasites found</i>	...	...	...	107
<i>Diagnosed as other diseases, and no parasites found</i>	...	...	...	110

The method recommended by SINTON was employed in the preparation of the films. A thick film at one end of the slide was divided from a thin film at the other end by a grease-pencil line, and after the addition of water to the Romanowsky stain on the thin film, the mixture was drawn over on to the thick film.

W. F.

BARBER (M. A.) & KOMP (W. H. W.). **Method of preparing and examining Thick Films for the Diagnosis of Malaria.**—*Public Health Rep.* 1929. Sept. 27. Vol. 44. No. 39. pp. 2330-2341. With 5 text figs. [1 ref.]

The authors insist on the importance of a good quality Giemsa strain, and that the water used for diluting it should be neutral or slightly alkaline and free from salts. They employ Grüber's Azur Eosin solution, which can be obtained from Karl Hollborn of Leipzig. The distilled water should have a reaction of pH 7.0 to 7.2. The blood can be conveniently collected from a puncture made on the dorsum of the middle finger a little below the base of the nail, care being taken not to touch the patient's skin with the slide, which must be free from grease. A drop of blood, about three or four times as much as is required for a thin film, is taken onto the slide near one end, and is spread out with the pricking needle over an area the size of the little finger nail. The patient's number is written on the other end with a grease pencil. The slide is placed, film side downwards, in its groove in the slide-box, which is stood on its end until the blood is dry enough not to run. Slides kept over-night in a closed box are sufficiently dry for staining next morning. Alternatively, the box may be left without its lid in the incubator for 60 to 75 minutes. If drying is insufficient, the film will come off in the staining bath; if it is too prolonged, the parasites will not stain properly. If it is necessary to keep the slides for some time before they can be stained, excessive drying can be prevented by wrapping them in paraffined (not kerosined) paper. The authors find that preliminary dehaemoglobinization and fixation of thick films are unnecessary. Sufficient stain for 25 slides is prepared by putting 60 or 70 drops (1.3 cc.) of Giemsa solution in the staining dish and adding 75 cc. of water. The slides are left in the stain for about half an hour. Differentiation is obtained by placing them in distilled water for five minutes. If the background is deep blue and the leucocytes almost black, the preparation is overstained.

Thin films may be made on the same slide as the thick films, at the other end, and the labelling done with an ordinary lead pencil on the thin film. The thin film can be stained later with Leishman's stain, if it is necessary to determine the type of parasite; a line drawn across the slide with a grease pencil prevents the stain running on to the thick film. It is unsafe to call anything a parasite unless it shows a red dot of chromatin associated with a blue mass of cytoplasm. Stained films can be preserved by covering them with liquid paraffin, or vaseline, and storing away from light. Immersion-oil must first be removed with xylol, after warming the slide slightly, and the xylol removed with absolute alcohol. When large numbers of slides require staining, small pieces of cardboard can be placed between the numbered ends, and the slides held in place by a rubber band. The block of slides can then be placed upright in the staining dish, with sufficient staining solution to cover the thick films at the other end.

W. F.

BARBER (M. A.) & KOMP (W. H. W.). **The Seasonal and Regional Incidence of Types of Malaria Parasites.**—*Public Health Rep.* 1929. Aug. 23. Vol. 44. No. 34. pp. 2048–2057. [1 ref.]

The authors examined 1,517 cases of malaria, most of which came from the Mississippi Delta. Only 41 per cent. of the infections in white persons were due to *P. falciparum*, but in coloured people 66 per cent. were due to this form of parasite. Benign tertian infections predominated among the whites in the spring, and subtertian in the autumn; in coloured people such seasonal variation was very slight. The authors attribute the different incidence of malaria in the two races to the lesser resistance of *P. falciparum* to the action of quinine, which is taken by the whites but is seldom taken by the coloured people. Crescents were found in 41 per cent. of the subtertian cases.

W. F.

BARBER (M. A.) & KOMP (W. H. W.). **The Malaria-Parasite Index of School Children in Leflore County, Miss.**—*Public Health Rep.* 1929. Sept. 6. Vol. 44. No. 36. pp. 2156–2162. [1 ref.]

Leflore County is situated in the alluvial plain forming the delta between the Mississippi and Yazoo rivers. The authors examined the children in a number of schools at different seasons during a number of years. During the years 1925 to 1929, 3,697 children were examined and malaria parasites were found in 9.5 per cent. The white children in both town and country, and the coloured children in the towns, showed approximately the same rate of infection, namely, 4.0 per cent.; but the coloured children in the country districts gave a rate nearly four times as high, namely, 15.6 per cent. In some schools there were wide variations in the parasite rate from year to year. The number of parasite cases among negro children was approximately double that detected at a single examination. The great majority of the negro children appeared to be in normal health in spite of their parasites; they received little treatment, and doubtless the majority "just wore their chills out." Many examples of "family malaria" were encountered in which certain families suffered more than their neighbours, not because they were exposed to more anopheles, but because they received less treatment or were less resistant.

W. F.

KLOTZ (Oskar). **Necrosis of the Liver in Malaria.**—*Amer. Jl. Trop. Med.* 1929. July. Vol. 9. No. 4. pp. 241-248. [9 refs.] [Dept. of Path., Univ., Toronto.]

The author, who is a member of the Yellow Fever Commission of the Rockefeller Foundation, has studied the morbid anatomy of the liver in malaria and blackwater fever with special reference to the differential diagnosis from yellow fever, and he has found that there is no difficulty in distinguishing them. In acute malignant malaria, a necrosis preceded by fatty degeneration begins in the central zone and spreads outwards towards the periphery of the lobule; malarial pigment is to be seen in the Kupffer cells, and parasites are present. In yellow fever, on the other hand, the necrosis begins in the middle zone of the lobule, and, though it spreads towards the centre, it leaves a ring of living cells around the central vein. The fatty changes are more intense in yellow fever. Councilman's hyaline acidophile bodies are to be found within the cytoplasm of the cells, and the nuclei undergo degenerative changes like those seen within the nuclei of the nerve-cells in herpes, which are said to indicate the presence of a virus. The necroses which the author found in the liver of a case of blackwater fever were similar to those found in malaria, and he concludes that "the liver necroses in blackwater fever are dependent upon the effect of the malarial infection alone."

W. F.

MICHELETTI (Ettore). Contributo allo studio delle localizzazioni parassitarie nelle infezioni malariche perniciose. (I. Nota preliminare sulle localizzazioni miocardiche). [**Localization of Parasites in Subtertian Malaria. (I. Localization in the Myocardium).**]—*Ann. di Med. Nav. e Colon.* 1929. Sept.-Oct. Year 35. Vol. 2. No. 3/4. pp. 162-180. With 6 figs. on 3 plates. [15 refs.] [Inst. of Path. Anat., Univ., Rome.]

The author describes the histological changes in two patients dying from subtertian malaria. The main alterations noted are a myocarditis with fragmentation and necrosis of the fibres, and the presence of parasites in the veins, but no engulfing of them or of pigment by the endothelial cells of the capillaries, thus differing from the changes seen in the organs, liver, spleen, bone-marrow, etc.

H. Harold Scott.

KING (W. V.). **On the Development of Malaria Parasites in the Mosquito.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 560-564. With 21 figs. on 7 plates. [1 ref.]

This paper is illustrated by a very beautiful series of photographs showing the sexual cycle of malaria parasites within the mosquito. Some of the mosquitoes' stomachs shown in the photographs contained enormous numbers of oöcysts; one was so covered with them that the photograph has a mulberry-like appearance and the actual number of cysts was estimated at 600. Such numbers are rare; in the majority of the mosquitoes examined by the authors there were less than 10

öcysts to be found. No evidence was obtained that the infection was hurtful to the mosquitoes; the average life following an infective blood meal was 16.5 days for 83 mosquitoes which became infected, and 15.2 days for 62 which remained uninfected. The author recapitulates the development of the parasites in the mosquito as follows: The macrogametocyte is fertilized in the insect's stomach and becomes an active zygote which penetrates the stomach wall and comes to rest between the epithelial cells and the elastic muscular coat; there it acquires a cyst wall and becomes an öcyst, about $7\ \mu$ in diameter, with hyaline protoplasm and a clump of dancing malaria pigment. The öcyst increases greatly in size, and bulges out into the body cavity of its host, remaining attached to the muscular wall by a very restricted neck of muscular tissue. When it has reached a size of 35 to 45 μ , the nucleus and protoplasm divide into sporoblasts; these become separate centres for the formation of sporozoites which appear as granular streaks. As the sporozoites grow, the number of sporoblasts is reduced by coalescence until the sporozoites assume a radial arrangement. At length the öcyst is filled by a squirming mass of sporozoites which rupture it and make their way through the body fluid to the salivary glands, where they infect either the central or the paired side lobes. The time required for development in the mosquito is usually given as 10 days. The shortest times observed in the author's experiments were 12 days with *P. falciparum*, at a mean temperature of 70°F. , and 14 days with *P. vivax* at 74°F.

W. F.

KING (W. V.). **Additional Notes on the Infection of Anopheles with Malaria Parasites.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 565-579. With 1 text fig. [3 refs.]

The author gives an account of the dissection of a number of anopheles, some of which had been fed on gametocyte carriers while others had been caught in native houses. The species were *A. quadrimaculatus*, *A. punctipennis*, and *A. crucians*. Mosquitoes fed on carriers became infected to the extent of 52.2 per cent., with a range varying between 11.1 and 94.4 per cent. in different batches. Infections were obtained from 10 out of 12 benign tertian patients, and 5 out of 6 subtertian patients. No significant differences were found as regards the percentage of successful infections, either between the different species of anopheles or between the different species of malaria parasites. Little or no correlation was found between the number of gametocytes in the blood and the proportion of mosquitoes which became infected, or the number of öcysts which were produced. In some of the mosquitoes, degeneration of the öcysts occurred when they were almost full grown; the cause of this was not discovered, nor is it known if such degeneration occurs under natural conditions. During the investigation of natural infections there were several instances in which infected mosquitoes were taken in consecutive collections from the same house over periods of days or weeks; in one such house, 17 out of 50 mosquitoes were found to be infected. The author kept his mosquitoes singly, in glass tubes, at a temperature of 45° to 55°F. , until they were required for experiment.

W. F.

CHEVALLIER (Paul) & SCHWOB (R.). Transmission fortuite du paludisme inoculé dans un service hospitalier. [**The Accidental Transmission of an Inoculation Strain of Malaria in a Hospital.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1929. Oct. 28. Year 45. 3rd Ser. No. 27. pp. 1189–1191. With 1 chart in text.

The authors report the occurrence of a case of accidental malaria in a Paris hospital where a large number of paralytics were undergoing treatment by the Wagner-Jauregg method. The patient in question, who had never been exposed to malaria, had been undergoing treatment with a new drug administered by inoculation, when nine days after its commencement she developed an attack of malaria with parasites in the blood and was cured by quinine. There were many mosquitoes in the hospital, but no anopheles could be found amongst them. The authors suggest that this accidental infection was conveyed direct on the proboscis of a culicine immediately after it had feed on a paralytic under treatment or that the carrier was an anopheles which had strayed in from the suburbs of the city. M. BRUMPT suggests that the infection was conveyed by the syringe employed in the inoculation of the new drug. [Though the authors do not agree with him, this certainly seems a more reasonable explanation.]

W. F.

CHEVALLIER (Paul). Quelques particularités des réimpaludations thérapeutiques. [**Some Peculiarities of Re-infections with Therapeutic Malaria.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1929. Oct. 28. Year 45. 3rd Ser. No. 27. pp. 1192–1194. With 3 charts in text.

It is not always difficult to re-infect people who have had malaria. Sometimes the incubation is much shorter and the fever higher than in those who have never suffered from the disease before. The author thinks that parasites are already present in the blood of such cases, though their numbers are insufficient to give rise to fever, and that the inoculation of infected blood increases them to the point necessary to cause an attack.

W. F.

BIGGAM (A. G.). **Malignant Malaria associated with the Administration of Heroin intravenously.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 147–153. With 1 plate.

During the last few years patients have been admitted occasionally to the Kasr el Aini Hospital, showing signs of repeated puncture of the veins of the arms, due to the intravenous administration of heroin. A photograph is given, showing the extensive pigmentation and scarring of the superficial veins of the arms which are characteristic of the drug addict. During the last few months a much larger number of these cases has been admitted. Intravenous injections have been popularized in Cairo by the tartar emetic treatment of bilharzial conditions, and the author thinks that it is for this reason that the heroin is given intravenously. It is injected with an unsterilized syringe; a little blood is sucked up before giving the inoculation to make sure that the needle is in the vein, and again at the end of the operation to ensure that the last drops of the drug are washed out of the syringe and injected into the addict.

During April 1929 certain of these heroin addicts were admitted with irregular temperatures, and their blood was found to contain malignant tertian parasites. This type of malaria is practically unknown in Cairo; no cases had been admitted to the hospital—apart from the drug addicts—for at least two months, and the author concludes that the infection was communicated during the injection of the heroin. Details of ten cases are given; they all had crescents in their blood, and Major Biggam considers that, unless steps can be taken to prevent the inoculation of heroin in this manner, there is grave danger that the disease may be conveyed to the general population of the city by the agency of mosquitoes. The Editor of the *Transactions* quotes other instances of the accidental conveyance of malarial infection by the syringe in giving salvarsan injections and in the transfusion of blood.

W. F.

GREEN (Richard). **The Relationship of the Blood Groups to Immunity from Malaria and to Gametocyte Formation.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 161–166. With 4 text figs. [2 refs.] [Inst. for Med. Research, Kuala Lumpur, F.M.S.]

The distribution of the four blood groups was investigated among 1,000 Tamils with malaria and 1,000 who were free from it. No connexion was traced between the incidence of the four blood groups, immunity to malaria in general, immunity to species of parasite, or the development of gametocytes. The distribution of the blood groups was as follows: Group (1) 145. Group (2) 391. Group (3) 671. Group (4) 793.

W. F.

CIUCA (M.), BALLIF (L.), VIERU (M.) & STIRBU (A.). Contrôle de l'immunité dans le paludisme par transfusion de sang virulent. [**The Transfusion of Virulent Blood as a Test of Immunity in Paludism.**]—*C.R. Soc. Biol.* 1929. Oct. 18. Vol. 102. No. 26. pp. 189–191. [1 ref.]

The authors found that persons who have become immune to the subcutaneous inoculation of benign tertian malaria, either as the result of therapeutic injections or long residence in an endemic area, are also immune to the transfusion of 65 to 220 cc. of citrated blood containing parasites. They recommend the transfusion of virulent blood as the best method of transmitting experimental infection.

W. F.

ROSENBERG (Max). Die Malaria in ihren Beziehungen zu Gonorrhöe, Lues und Neurolyues. [**Malaria in Relation to Gonorrhoea and Neurosyphilis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Sept. Vol. 33. No. 9. pp. 463–467.

As regards gonorrhoea, the author divides the cases into two groups: group A includes cases which had suffered from malaria before being attacked by gonorrhoea; group B cases which had not suffered from malaria. The treatment of the gonorrhoea in both groups was on the usual lines, but recovery in group A was much more rapid than in group B.

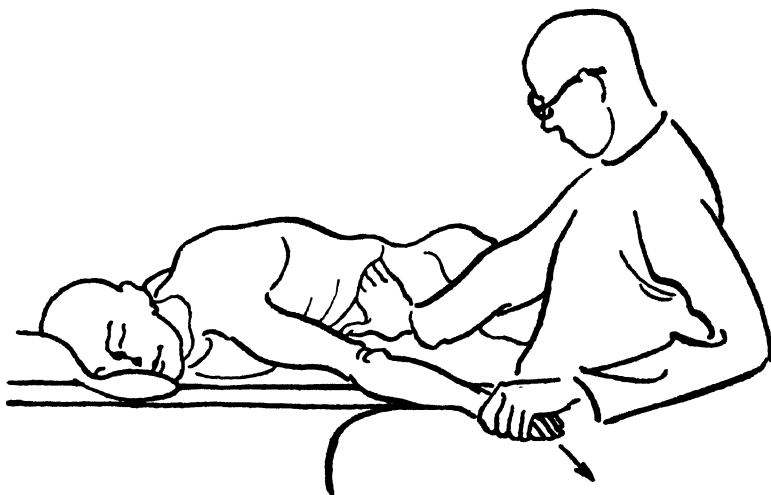
As regards syphilis, he asks two questions : (1) Why do cases of neuro-syphilis occur in towns? (2) Why is it absent in villages? Discussing the relationship of malaria to syphilis, he states that 70 per cent. of the population of villages are infected with malaria, whilst those in towns are protected by the antimalarial measures. He considers that malaria acts both as a prophylactic by preventing the entrance of the spirochaete into the nervous system and by direct cure of the neuro-syphilis.

The observations were made on his Arab patients in Palestine.

E. D. W. Greig.

SCHOTTER (Hans). Zur Methodik der Milzpalpation. [**Spleen Palpation.**].—*Muench. Med. Woch.* 1929. Sept. 13. Vol. 76. No. 37. pp. 1562–1563. With 3 text figs. [Clinic for Infect. Diseases, 2nd State Univ., Moscow.]

The author has employed his method of palpating the spleen for 15 years with good results. He thus describes his procedure. The physician sits on the right of the patient at the level of the pelvis ;



Method of spleen palpation.

[Reproduced from *Muenchener Medizinische Wochenschrift.*]

the patient lies on his back with his head on a pillow. The physician grasps with his left hand the left wrist of the patient and draws the patient on to the right side, and at the same time places his right hand on the pelvis, and pushes it slightly backwards, when a fold develops at the left costal margin. The right hand of the physician is now placed on the abdomen of the patient in such a manner that the tips of the index and middle fingers touch the costal margin in the splenic region, the hand is pressed in with light pressure, but the finger tips are not pushed under the costal margin. The palpating hand is never raised, and tension on left wrist is maintained during the whole examination. This method differs from the ordinary method, where the hand is

pressed towards the spleen, as, by pulling over the left arm of the patient, the region of the spleen is pushed towards the palpating right hand. Deep inspiration naturally makes the palpation easier, and the border of the spleen can be definitely felt and its form and consistence determined. The procedure is made clear by three text figures.

E. D. W. Greig.

IYENGAR (M. O. T.) & SUR (Panchanan). **Seasonal Variations of the Spleen-Rate.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 11–32. With 6 charts. [6 refs.]

The authors conclude, as the result of a study extending over several years in villages of both high and low malarial endemicity, that the spleen rate varies with the seasons. They found that in areas of moderate endemicity it was usually far lower in the dry season than in the wet season. A small rise, which they attribute to relapses due to sudden changes of temperature, often occurred in the early spring. In areas of extreme hyperendemicity the spleens became smaller in the dry season, but as they were still palpable this reduction in size was not sufficient to reduce the spleen index. The authors point out that their observations show the fallacy of judging the relative endemicity of a number of districts by a comparison of spleen rates collected at different seasons. They hope by further observations to obtain a formula by which the average spleen index of the year may be calculated from a single observation made during any particular month.

W. F.

SURBEK (K. E.). Ueber die Frequenz der Milzvergrößerung bei den verschiedenen Formen der Malaria. [**Frequency of Splenic Enlargement in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Sept. Vol. 33. No. 9. pp. 461–463.

Observations were made on cases in hospital, mostly on Javanese land workers. The results are set out in the following statement :—

1. Benign Tertian. (Over 100 blood positive cases.)
Spleen palpable in 64 per cent.
Spleen not palpable in 36 per cent.
2. Malignant Tertian. (Over 70 blood positive cases.)
Spleen palpable in 30 per cent.
Spleen not palpable in 70 per cent.
3. Quartan. (Only 6 cases.)
Spleen palpable in all.

The author notes that the numbers are too small to draw definite conclusions. However, it is noteworthy that in 70 per cent. of the malignant tertian cases the spleen is not palpable, and yet the cases were very severe (3 fatal), with a heavy infection of the blood with rings and crescents. In benign tertian the correlation between the parasite index and spleen index is much closer than in the malignant form. The importance of a parasite index in malarial regions in which *P. falciparum* infection occurs is emphasized.

E. D. W. Greig.

CAWADAS (Eust.). Les manifestations laryngologiques du paludisme latent. [**The Laryngeal Manifestations of Latent Malaria.**]—*Grèce Méd.* 1929. Mar.-Apr. Vol. 31. No. 3-4. pp. 9-11.

The author, who is a specialist in laryngology at Athens, describes four cases which were sent to him with laryngeal symptoms and slight fever. He found that the upper air passages were congested, but there were no signs of acute or of long continued chronic inflammation. None of the patients gave a history of malaria, but on examination of their blood benign tertian parasites were found and they were quickly and permanently cured by quinine. The author attributes the symptoms, such as hoarseness, cough, and occasional pain on swallowing, to congestion following the action of the malaria parasites on the blood-vessels.

W. F.

MONTELEONE (Remo). Significato delle modificazioni della frequenza della pulsazioni nella malaria. Studio clinico-sperimentale. (**Tachysphygmia in Malaria.**)—*Riv. di Malariologia.* 1929. July-Aug. Vol. 8. No. 4. pp. 401-435. With 10 graphs. [11 refs.] [English summary p. 479.]

Characteristic variations have been observed in sphygmograms, taken during the course of malarial infections, which sometimes lead to the detection of "masked malarial attacks." Charts of typical benign tertian malaria are given which show that, after the fever has been suppressed by treatment, there may be a rise of pulse rate on alternate days. The author interprets these rises as indications of latent malaria.

W. F.

MATSUSHIMA (Rihei), TAGUCHI (Seihei), SUENAGA (Daishiro) & OHYA (Otoichi). **A Case of Raynaud's Disease caused by Malaria.**—*Taiwan Igakkaï Shi (Jl. Taiwan Med. Soc.)* 1928. Feb. No. 287. [Summarized in *Japan Med. World.* 1929. June 15. Vol. 9. No. 6. pp. 193-194.]

"The authors reported a case of Raynaud's disease, caused by tertian malaria. Since Mulsau reported that Raynaud's disease may be caused by malaria, several cases have been reported, but their case was the first one in Japan. The patient was a soldier, age 25, who entered the hospital with attacks of malaria. The diagnosis was confirmed by blood examination. While in the hospital the patient had remitting attacks of high fever, rapid pulse, and light cyanosis of fingers and tired feeling in the lower extremities. Later, the heart-beat became impure, and the cyanosis increased with typical pains."

W. F.

FERRÃO (Pires). De um caso anômalo de urticaria palustre. [**Malarial Urticaria.**]—*Arch. Brasileiros de Med.* 1929. Aug. Vol. 19. No. 8. pp. 435-442.

The patient with *P. vivax* in her blood had attacks of generalized urticaria lasting for 8 hours, on four occasions, the rash disappearing on alternate days. Treatment by methylene blue, 50 cgm. in five capsules, and quinoform, 60 cgm. in a single dose, four hours before the expected attack brought about a cure.

H. Harold Scott.

SMITH (S.). **The Malaria Treatment Centre—Kasauli.**—*Jl. Roy. Army Med. Corps.* 1929. Aug. & Sept. Vol. 53. Nos. 2 & 3. pp. 81-93; 173-185. With 2 charts & 1 fig. [1 ref.]

The Malaria Treatment Centre at Kasauli, near Simla, is situated at an altitude of 6,100 feet, and there is no possibility of re-infection. It was inaugurated in 1924, "in the hope of finding a really satisfactory treatment for chronic relapsing malaria." The convalescents live in barracks, where accommodation is available for 150 men. A physical training staff is provided, and all station guards, fatigues, and the like duties are performed by the patients themselves. Thirty beds are reserved at the British Military Hospital for those who relapse. During the year reviewed by Major Smith, 240 convalescents joined the Centre, 84 of whom relapsed and were admitted to hospital while they were there: 77 with benign tertian, 5 with subtertian, and 2 with mixed tertian. It is noted that herpes labialis was present in 26 per cent. of these cases. Most of the men put on 4 or 5 pounds in weight while they were at Kasauli, and added about 10 per cent. to their haemoglobin. Half a pound of cooked liver was given to all those whose haemoglobin fell below 70 per cent., but the author states that it had "no striking curative action." Details of several instructive cases are given. A patient with benign tertian malaria, who continued to run an irregular temperature in spite of quinine, was sent, as a case of resistant malaria, to the hospital, where *Bact. typhosum* was isolated from his stools. Another case illustrates "the fallacy of the argument, brought forward by some, that plasmoquin, in order to produce a cure, must be pushed sufficiently to produce toxic symptoms." The patient, prior to his admission to the Centre, was given a very large toxic dose of plasmoquin owing to a misunderstanding, and he was dangerously ill in consequence; yet he relapsed four times after arrival at the Centre, and was finally invalided home. A series of 16 cases was given a continuous course consisting of 0.06 gram of plasmoquin and 20 grains of quinine daily; 10 of the patients showed toxic symptoms, and treatment had to be stopped after nine or ten days. The most satisfactory results were obtained with plasmoquin 0.04 gram and quinine 20 grains daily. Six patients were given intramuscular injections of 0.03 gram plasmoquin with good results and without pain. The author considers that "expert daily supervision is essential in the case of patients undergoing treatment with any form of plasmoquin."

Parosan, "a drug allied to stovarsol," and quinine parosan oxide were administered to a small series of patients. No toxic effects were observed, but malaria parasites persisted in the blood of several of the patients.

W. F.

SEGAL (M.) & BLOCH (J.). Beitrag zur Plasmochintherapie. [**Plasmochin Therapy.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Oct. Vol. 33. No. 10. pp. 532-535.

Only 24 cases of malaria were treated. Four were clinically diagnosed, the remainder microscopically, 7 being *P. vivax* infections, 12 *P. falciparum* infections, and 1 quartan malaria. With one exception they were all treated as outdoor cases, and therefore there were certain gaps in the investigation. As the quantity of plasmochin available was limited, only small doses could be given, and varied from 0.01 to 0.04 gm. daily. Cyanosis and pains in stomach were noted in

one case. The authors conclude : (1) Plasmochin, even in small doses, has an extremely powerful gameticidal action. (2) Plasmochin has a much more powerful action on the gametes of *P. falciparum* than quinine. (3) The results of the ambulatory plasmochin treatment must be controlled by many observations at the bedside. (4) Without doubt plasmochin represents a great advance in malaria therapy. In Turkistan, where the investigations were carried out, it was of particular value for the quinine-resistant cases met with there.

E. D. W. Greig.

TORRIOLI (M.). Sull' impiego della plasmochina nei casi di emoglobinuria da chinina. [**Plasmochin for Patients who have previously exhibited Quinine Haemoglobinuria.**—*Polichinico*. Sez. Prat. 1929. Sept. 16. Vol. 36. No. 37. pp. 1311-1314. [4 refs.] [R. Inst. Clin. Med., Univ., Rome.]

The question whether to give quinine to a malarious patient in whom, on a previous occasion, its use has been followed by haemoglobinuria is always an anxious one for the tropical practitioner. The author consequently compared after the method of GHIRON (this *Bulletin*, Vol. 24, p. 657), the effects of quinine and plasmochin, thus : In a series of ten tubes were placed 20 drops of plasmochin in graded strengths from 1.0 to 0.1 per cent. To each were then added two drops of a suspension of washed corpuscles of a malarious patient and after 5 minutes at 37° C. two drops of the serum of a haemoglobinuric patient. A similar series was put up using quinine in place of plasmochin. He found that haemolysis occurred much earlier and in much lower concentration with quinine than with plasmochin, and concludes that the latter can be given with safety although a history of previous quinine haemoglobinuria is obtained.

H. Harold Scott.

HASSELMANN (C. M.) & HASSELMANN-KAHLERT (Margarete). Erfahrungen und Zwischenfälle bei der Plasmochinbehandlung autochthoner Malaria in den Tropen. [**Plasmochin Treatment of Malaria in the Tropics.**—*Deut. Med. Woch.* 1929. Sept. 27. Vol. 55. No. 39. pp. 1635-1637. [19 refs.]

The authors treated 103 cases of malaria in Manila with plasmochin and plasmochin compound. Forty-three of the cases were pure *P. vivax* infections ; 37 *P. falciparum* infections ; twenty-three were mixed. Quartan infection is very rare in the Philippines. The conclusions reached are : (1) In agreement with MÜHLENS, a good parasitocidal effect was obtained with daily doses of 0.12 gm. of plasmochin in benign tertian, and with 0.06 gm. plasmochin and 0.75 gm. quinine sulphate in mixed infections, and in malignant tertian. (2) In double infections, where at first only one kind of parasite was found in the peripheral blood, pure plasmochin had a definite provocative action on *P. falciparum*, and plasmochin compound a provocative action on *P. vivax*. (3) It was noteworthy that in such cases pure plasmochin acted provocatively on both schizonts and crescents in *P. falciparum* infections, but plasmochin compound, on the contrary, only acted provocatively on the schizonts, never on gametes of *P. vivax*. (4) After administration of pure plasmochin the rings of *P. falciparum* acquired a certain degree of " tolerance," and were more difficult to destroy than

when plasmochin compound was given at once. Also when insufficient plasmochin was given a certain degree of resistance was noted. (5) Crescents may appear during the administration of plasmochin. (6) More or less severe toxic effects may occur, from cyanosis and pain in the stomach to severe hepatitis. (7) In their series they noted almost always marked cyanotic conditions, often with urobilin or urobilinogen in the urine, and comparatively slight stomach pains. (8) A specially severe toxic action on the white blood cells with the appearance of damaged marrow cells was noted as has been described in typhus fever, smallpox and pemphigus. (9) Because of its toxic action plasmochin should only be given under medical control. Its use as a prophylactic has not been established. It should be sold only on presentation of a prescription.

E. D. W. Greig.

DE MELLO (Froilano). Sur l'emploi de la plasmoquine dans le traitement du paludisme. [**The Use of Plasmoquin in the Treatment of Paludism.**—*Presse Méd.* 1929. Sept. 18. Vol. 37. No. 75. pp. 1215–1217. [School of Med., Nova Goa.]

The author has employed plasmoquin in Goa with the same results that other observers have obtained elsewhere. It rapidly destroyed the gametocytes of all species of malaria parasites, and also the asexual forms of *P. vivax* and *P. malariae*. The red cells and the haemoglobin increased during treatment and the size of the spleen was diminished. Dr. de Mello concludes that plasmoquin has no action on subtertian schizonts, but that this difficulty can be overcome by giving quinine in addition. He found that toxic symptoms, such as pains in the stomach and cyanosis, quickly disappeared when the drug was stopped, but he recommends that it should not be given without medical supervision.

W. F.

WITTGENSTEIN (Annelise). Zur Chininempfindlichkeit der Impfmalaria. [**Quinine Sensibility of Inoculation Malaria.**—*Deut. Med. Woch.* 1929. Nov. 22. Vol. 55. No. 47. p. 1959. [1 ref.] [III. Med. Polyclinic, Univ., Berlin.]

The author points out that inoculation malaria is much more sensitive to quinine than is malaria produced by the bite of a mosquito. From the observations recorded it is concluded that for the purpose of mitigating an attack of inoculation malaria the usual dose of quinine, from 0.1–0.2 gm., even the lowest limit, is too high. The author employs for the purpose pills containing 0.05 gm. quinine base. It is thought that spirocid might be preferable to quinine for mitigating an attack.

E. D. W. Greig.

DE LUCA (Benedetto). Lo stovarsolo e lo stovarsolo sodico nella cura della malaria. (**Stovarsol and Sodium Stovarsolate in Malaria.**)—*Riv. di Malariologia.* 1929. Sept.–Oct. Vol. 8. No. 5. pp. 569–584. [19 refs.] [English summary p. 634.]

During 1925–26 the author tested the effects of stovarsol and its sodium salt on 54 cases of unmixed infection with malaria, 30 benign tertian, 19 subtertian, and 5 quartan, and on 4 cases of mixed benign

and malignant tertian, and one of subtertian and quartan. The dose never exceeded 1 gm., and in nearly all was 0.75 gm. of stovarsol or 0.5 gm. of the sodium salt. The former was given orally only, the latter was tried intravenously also. Brief details of all the patients are given; it was found that the drugs acted best on benign tertian, but even here they were not reliable, relapses being fairly frequent; in subtertian and quartan they were even less effective and had no action on subtertian gametocytes. Though well tolerated by mouth, when given intravenously the results were at times severe headache, pain in the joints and albuminuria. These symptoms usually soon passed off and left no signs of permanent renal mischief.

H. Harold Scott.

HOOPER (David). **On the Standardisation of Cinchona Febrifuge.**—*Quarterly Jl. Pharm. & Pharmacol.* 1929. Apr.–June. Vol. 2. No. 2. pp. 186–188.

An outline of the history of febrifuge, or quinetum, is given in this paper. The cinchona trees which were first cultivated in India were mostly *Cinchona succirubra* (red bark) and cinchona febrifuge was originally a mixture of the total alkaloids extracted from their bark. These trees were gradually replaced by other kinds richer in quinine, and the scarcity of red bark, in 1903 led to an alteration in the manufacture of febrifuge. Since that year it has been made from the alkaloids which remain after the extraction of the quinine from yellow bark trees. The author draws attention to the wide variations in the composition of different samples of the febrifuge; "one would hesitate," he writes, "to render official a mixture of five alkaloids the proportion of which depends upon the exigencies of the cinchona plantations and the quinine factories." He agrees with Col. GAGE, that a remedy may be found in a return to the cultivation of *C. succirubra* and the preparation of a febrifuge in large quantities from its bark.

W. F.

FIorentini (Augusto). Nevriti e nevralgie sciatiche da malaria. (Patogenesi e contributo clinico.) [**Malarial Sciatica and Neuritis.**]—*Polislinico*. Sez. Med. 1929. Oct. 1. Vol. 36. No. 10. pp. 520–527.

[This paper is worthy of attention on account of the moral which it inculcates for those going out to practise in the tropics.] Three cases are recorded, two diagnosed as sciatic neuritis due to malaria, the third as neuralgia from the same cause.

[The connexion of the last with malaria is doubtful.]

The other two are more serious in their import; they are fairly similar and the first only need be detailed. A man, 18 years of age, suffered from a prolonged bout of fever, with bronchial catarrh, meteorism, enlargement of spleen; Widal negative. The blood smears showed sparse rings of *P. falciparum*. Two grams of quinine were injected hypodermically [1] on July 27th, and again on 29th; the fever was continuous and remittent, so plasmoquine by mouth was given in addition on August 3rd; after irregular intermissions the temperature reached normal on August 29th. On the 8th the daily dose of quinine had been reduced to 1.5 gm. and on the 22nd to 1.0 gm. till September 1st. On August 8th the patient complained of

pain along the sciatic, and three days later a gluteal abscess formed at the site of injection. The neuritis was severe and the reaction of degeneration in both muscles and nerve was present in September, and persisted as long as the patient remained under observation. [Comment is needless.]

H. Harold Scott.

ULLMANN-APOSTOLON (Renée) & APOSTOLON (Georges). Traitement du paludisme chronique par le cacodylate de soude à hautes doses. [**The Treatment of Paludism with Large Doses of Sodium Cacodylate.**]—*Presse Méd.* 1929. Aug. 31. Vol. 37. No. 70. p. 1137.

The authors claim that the following treatment which is employed by them in Macedonia is a true specific for chronic paludism even of the worst type, and that it reduces the largest spleens to normal. As an authority for the use of such high doses they quote Professor CARNOT & M. P. RAVAUT.

On the first day of treatment, 0.5 cgm. of sodium cacodylate is injected intravenously, 1 mgm. of strychnine is given hypodermically, and 1.5 gram of quinine is given by the mouth. On the second day, the cacodylate is increased to 1 gram and the strychnine to 2 mgm. The quinine is continued throughout the treatment, and the strychnine may be increased if necessary. The treatment is continued until the seventh day, when the cacodylate is increased to 1.5 gram if there are no contra-indications. When 15 to 18 grams have been administered, the patient rests without treatment for 10 days. A second course is then given, followed by an interval of 20 days, and after this comes a third series, with a month's interval before a fourth. Four courses are usually sufficient to cure the patient, but should his spleen remain enlarged after an interval of three months, two or three additional courses should be given.

[This treatment cannot be free from danger. The average dose of sodium cacodylate is $\frac{1}{4}$ to 1 grain or 0.03 to 0.06 gram. The maximum dose according to the French Codex is 3 grains or 0.19 gram in 24 hours.]

W. F.

HENRY (A. F. X.). Séro-flocculation palustre. Conditions d'observation, interprétation et discussion des résultats. [**Seroflocculation in Malaria. The Conditions to be observed, Interpretation and Discussion of the Results.**]—*C.R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25. pp. 1026-1029. [2 refs.]

The author insists that the greatest attention should be paid to details in making these tests. The results of ferro-flocculation should be read after three hours—2½ hours in the incubator at 37° C. and 30 minutes at room temperature. Flocculation or much opacity, in the control tubes, renders the reactions void. Melano-flocculation tests should be read after 2½ hours—2¼ hours in the incubator and 15 minutes at room temperature. An agglutinoscope is employed, and the tubes are gently reversed twice before reading the result. Only definite reactions are counted as positive. The author prefers a photometric method to simple macroscopic observation, and gives a formula for calculating the results. They are interpreted as follows:—

- (1) Ferro-flocculation and melano-flocculation clearly positive. Almost certain malaria.
- (2) One definitely positive and the other slightly positive. Almost always due to malaria.
- (3) Both slightly positive. Doubtful.
- (4) Dissociated reaction, one positive and one negative. Malaria is probable only if the positive reaction is very definite.

(5) Both negative. This result is inconclusive ; the test should be repeated when there is no fever, because the reaction sometimes becomes negative during an attack.

It is urged that in addition to making these serological tests the blood should be examined for parasites, the leucocytes should be counted, and the symptoms taken into account before the diagnosis is made. The melano-flocculation reaction is generally more sensitive than the ferro-flocculation reaction and it persists longer.

W. F.

LE BOURDELLÈS (B.) & LIÉGEOIS (R.). Sur la mélanoflocculation. Influence du temps de réaction. Les aspects du flocculat en eau distillée et eau salée ; leur signification. [**Melano flocculation. The Influence of Time on the Reaction. The Appearance and Significance of Flocculation in Water and in Salt Solution.**—*C.R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25. pp. 1148-1149. [2 refs.]

In a former communication the authors reported (see this *Bulletin*, Vol. 26, p. 941) 25 per cent. of positive reactions in non-malarious controls with Henry's melano-antigen. These reactions were slow, almost always limited to the tubes containing distilled water, and accompanied by a negative ferro-flocculation. The readings were taken at the end of four hours. In a new series they have obtained satisfactory results by shortening the time to three hours as recommended by HENRY, and they now consider the reaction of the greatest diagnostic value. They point out that positive sera which give a dull white or light brown flocculation in the distilled water tubes often give a dark brown or black flocculation in the saline tubes. These shades are best seen in reflected artificial light. The authors conclude that melanin plays an active and probably antigenic part in the reaction.

W. F.

LE BOURDELLÈS (B.) & LIÉGEOIS (R.). Le séroflocculation du paludisme (réaction de Henry) ; son intérêt clinique. [**Seroflocculation in Malaria (Henry's Reaction) : its Clinical Importance.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1929. Oct. 28. Year 45. 3rd Ser. No. 27. pp. 1198-1202. [2 refs.]

The authors state that the theory on which HENRY bases his reaction (see this *Bulletin*, Vol. 26, pp. 940-942) is as follows : In addition to the antigens which are introduced into the body from without—the "exo-antigens"—there are also antigens produced within the body in response to various stimuli. These he calls the "endo-antigens" or "endogenes." The endogenes determine the formation of antibodies—the "anti-endogenes." The endogenes of malaria are the malarial pigments, and, in order to detect the presence of their anti-endogenes, HENRY employs homologous antigens prepared from choroidal pigment and from organic iron salts, which produce specific flocculation when in contact with malarial serum. These flocculations are called, respectively, "melano-flocculation" and "ferro-flocculation."

The authors give the results of flocculation tests in 400 cases, which they divide into five categories.

(1) *Examined during an attack of malaria, 58 cases.* Patients who were therapeutically inoculated with malaria gave negative reactions during the incubation and during the initial stages of the fever, but when the attack was in full swing the reaction always became positive.

(2) *Old cases of malaria with enlarged spleens, 37 cases.* Melano-flocculation was constantly positive; ferro-flocculation was positive in 20.

(3) *A similar group but without enlarged spleens, 37 cases.* Melano-flocculation was positive in 16, and ferro-flocculation in 10.

(4) *A group of men who had been infected some ten years before, and who were immediately repatriated and treated with quinine, 82 cases.* The results were almost all negative.

(5) *A control group consisting of 88 healthy persons and 122 who were suffering from various diseases.* The results were generally negative if the results were read at the end of three hours, as recommended by HENRY. HENRY states that the reaction is positive in haemocytoclastic diseases, and the authors found it positive in a case of syphilis. They consider that it should be employed to regulate the quinine treatment of malaria in the same way as the Wassermann reaction is used to regulate the salvarsan treatment of syphilis.

W. F.

STRICKLAND (C.). **The Relative Malarial Infectivity of Some Species of Anophelines in Cachar (Assam).**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 174–182. [3 refs.]

This study is supplementary to Dr. Strickland's Report on Malaria in the Duars Tea-Gardens (see this *Bulletin*, Vol. 26, p. 909). Mosquitoes to the number of 10,000, caught mostly by trapping between April and December 1927, were identified and dissected by five specially trained laboratory assistants. The results were as follows: *A. funestus*, caught 1,489; infected 58. *A. Vagus*, caught 1,341; infected 1. *A. karwari*, caught 1,697; infected 1. *A. philippinensis*, caught 2,410; infected 0. *A. hyrcanus*, caught 1,757; infected 0. Dr. Strickland concludes that the "experiment has definitely confirmed the enormous relative importance of *funestus* in the malaria problem of the Assam tea-gardens."

W. F.

AVERBOOKH (J.). **To the Study of the Consequence of the *Anopheles pulcherrimus* in the Malaria's Etiology.**—*Pensée Méd. d'Usbekistane.* Tashkent. 1928. Feb. No. 5. pp. 21–25. [4 refs.] [In Russian. English summary p. 92.]

The author fed 12 specimens of *A. pulcherrimus* on malaria patients, with the result that zygotes appeared in 5 of the mosquitoes, but he did not succeed in conveying the infection to other persons. When these anopheles are fed on patients with *P. vivax* in the blood, zygotes appear about 8 days later, and sporozoites after about 14 days, if the mosquitoes are kept at a temperature of 26° to 30° C.

W. F.

STEINFELD (Fritz). Uebertragungsversuche von Menschenmalaria auf Affen. [Experiments to transmit Human Malaria to Monkeys.] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 592-594. With 2 text figs. [Inst. for Ship & Trop. Diseases, Hamburg.]

Two monkeys, whose spleens had been removed, received intravenously and subcutaneously human malaria (*P. malariae* and *P. falciparum*). The blood of the monkeys was examined daily, but remained free from parasites. In the quartan monkey a pigmented leucocyte was found. Adrenalin provocation was without result. In the monkey infected with *P. falciparum* the R.E. system was blocked before the third inoculation of blood to lower resistance. The quartan monkey died on the 12th day from an unknown cause. No parasites were found in the internal organs. The only positive result was the finding of pigment in the kidney and liver.

E. D. W. Greig.

RUGE (Heinrich), LOHFELDT, KNABE, EISENBERG & KUNERT. Beiträge zur pathologischen Physiologie der Malaria. (Untersuchungen ueber das Verhalten des Blutzuckers, des Reststickstoffes sowie der Nieren- und Magenfunktion.) [The Pathological Physiology of Malaria.] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 567-587. With 15 text figs. & 14 charts. [Inst. for Ship & Trop. Diseases, Hamburg.]

The cases which formed the subject of this investigation were chiefly amongst seamen who were suffering from active malaria or had previously passed through an attack. The stimulus to start the investigation arose from the observation that stomach troubles are comparatively frequent amongst those who had acquired malaria during the war and had been treated with quinine. All three varieties of malarial infection were represented in the cases. The investigations comprised: (1) The estimation of the blood sugar in 140 cases. (2) Estimation of the non-protein nitrogen in 143 cases. (3) Water estimations in 60 acute cases and 30 old cases. This estimation was made by giving 1,500 cc. tea and noting the amount and specific gravity of fluid excreted in the first six hours; it was reckoned that 1,500 cc. \pm 10 per cent. should be excreted in this time. (4) Estimation of the stomach function: (a) by chemical investigation; (b) X-ray examination. The authors conclude from their investigations: That an increase of blood sugar only occasionally occurs in malaria. It does not exceed 130 mgm. per cent. The non-protein nitrogen during the fever period reaches the upper normal limit. In uncomplicated cases of malaria 40 mgm. per cent. are rarely exceeded, still less frequently after cessation of the fever and disappearance of parasites. The water estimations show that in about three-quarters of the cases investigated there is a certain delay in excretion associated with good concentration. Two cases of black-water fever gave a very delayed excretion and once the non-protein nitrogen reached 48 mgm. per cent. The influence of residence in the tropics, quinine, etc., is seen in the results of the chemical investigations of the stomach. They found in about half to two-thirds of the cases hypo- or achlorhydria [this is interesting in relation to sprue] and one-fifth have hyperchlorhydria. The X-ray examination did not show any pathological alterations in the stomach in malaria.

E. D. W. Greig.

HORN (Ludwig) & KAUDERS (Otto). Ueber das Verhalten der Parasiten bei der Impfmalaria unter den besonderen Bedingungen der Malariablutkonservierung und der latenten Malariainfektion. [**Behaviour of the Parasites of Inoculation Malaria in Preserved Blood and Latent Malarial Infection.**]—*Ztschr. f. Parasitenk.* 1929. Oct. 12. Vol. 2. No. 2. pp. 178–212. With 15 figs. (3 coloured). [22 refs.] [Psychiat. Clinic, Univ., Vienna.]

This investigation was carried out by the authors in the clinic of Professor WAGNER-JAUREGG. The changes in morphology of the *P. vivax* were noted in blood from patients inoculated with malaria and preserved in various ways, viz., citrated; in blood agar; blood mixed with gelatine; blood alone; preserved in the ice chest, at room temperature, in incubator at 37° C.; defibrinated blood. The observations on latent malarial infection were made by examining the parasites in patients who had received a second inoculation of malaria and in whom a fever-free interval occurred; although the fever had subsided, yet the blood was proved to be infective by inoculation into another patient. Further, if the serum of such a patient with a latent infection be injected immediately after an intravenous injection of malarial blood a similar fever-free or latent malarial infection is produced. The authors give full details of the very careful observations. From a consideration of their results they reach the following conclusions. Under the altered biological conditions of preservation and latent infections the parasites change into extraglobular, round, gamete-like structures, which are morphologically indistinguishable from true gametes. It is known that the sexual forms of the malarial parasite are the least susceptible to unfavourable conditions, such, for example, as the administration of quinine. They regard the production of gamete-like round bodies as a degeneration process, but when they are replaced in favourable conditions they are capable of living and producing fresh infection. The action of quinine on the parasites will form the subject of a further investigation. The morphological changes described are illustrated in 15 microphotographs.

E. D. W. Greig.

SIRCA (Antonio). Comportamento della riserva alcalina del sangue nei bambini malarici. [**The Blood Alkali Reserve in Children with Malaria.**]—*Pediatrics*. 1929. Sept. 1. Vol. 37. No. 17. pp. 947–951. [13 refs.] [Inst. Clin. Pediatrics, Univ., Sassari.]

BOSISIO had estimated the alkali reserve in adults with malaria, but the author, examining the same in fifteen children, all of whom were proved to have malarial parasites in the blood, arrived at somewhat different results. During an acute febrile access the reserve is lowered, as had been recorded by Bosisio in adults, but during the apyrexial period it was found to be normal. In chronic cases with enlarged liver and spleen and marked anaemia he found the reserve very high, whereas Bosisio in adults had found it normal.

H. Harold Scott.

POTAPENKO (N. A.). [Die osmotische Resistenz der Erythrocyten bei Malaria.] [**Osmotic Resistance of Red Cells in Malaria.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 4. pp. 234–239. [In Russian. German summary pp. 239–240.]

The work was carried out during 1925 and 1926 at the Malaria Station of Dnjeopetrovsk [Russia]. In all 140 cases were investigated. [Nature of

the malarial infection is not specified in the summary.] In order to study the relationship of osmotic resistance of red cells to the clinical course of malaria, patients were grouped into those running: (1) A severe course with complications. (2) An ordinary course with complications. (3) An ordinary course without complications. In all three groups there was a typical lowering of the minimal osmotic resistance of red cells. The maximal resistance varied little in the three groups.

E. D. W. Greig.

PORTO RICO. REPORT OF THE COMMISSIONER OF HEALTH TO THE GOVERNOR OF PORTO RICO FOR FISCAL YEAR ENDING JUNE 30, 1927. pp. 62-95.—**Report of Bureau of Malaria Control 1926-27.**

Malaria in Porto Rico is intimately associated with the irrigation of sugar-cane fields and with tidal swamps. The two common species of anopheles are *A. albimanus* and *A. grabhami*. Control measures have been undertaken in limited zones round the towns and villages; the main practice adopted was to drain whatever could be drained, and to apply Paris green—1 per cent. in powdered limestone—to the remainder at weekly intervals. Automatic tide gates were found most useful in the lowland fields near the coast; when fresh water (? a fresh supply of sea-water) was kept out by their use, a scum formed on the surface and larvae failed to develop. Screening of houses is widely used in Porto Rico, but the screens are quickly destroyed by the salt-laden air. Several materials have been tested; cloth screens kept out the air and they rotted very quickly; bronze screens and copper screens outlasted galvanized iron, but for use near the sea the "Model" metal of the American Wire Fabric Co. appeared to be the best. There appeared to be no advantage in using a screen with a mesh finer than that needed to keep out mosquitoes, because "the small biting flies seem to be able to pass through anything that air will pass through." Screening was found preferable to mosquito nets. Observations were made on the feeding habits of *A. albimanus* and *A. grabhami* in order to discover whether they prefer to feed on men or on domestic animals. For this purpose, men were placed in a specially built house and various animals were tethered close to the entrance. The mosquitoes subsequently caught in the house were examined by precipitin tests to determine the source of the blood in their stomachs. *A. grabhami* preferred animals to men, and it was found that the proximity of horses or oxen afforded considerable protection when they were placed between the men and the breeding-places of the mosquitoes. It was concluded that "whether people will be bitten or not will depend upon the proximity and position of the animals with relation to the breeding-places and the direction of the wind."

W. F.

GROSS (R. D.). **Effectiveness of Antimalaria Measures in Rural Singapore.**—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 91-92.

The annual report for Singapore showed that there were as many deaths from malaria in 1928 as there were before anti-malaria work in rural areas was commenced. The author attributes this to the influx of infected immigrants from China and Johore, to the lack of hygienic precautions on small native estates, and to the opening up of large areas of forest by Chinese squatters who settle themselves on the land

while jungle-felling is in progress and before any oiling or other anti-malaria measures can be undertaken. In established villages where anti-malaria work has been carried out, there has been a great reduction of infection; for example, before work was commenced in 1921, the spleen rates of three of these villages were, respectively, 39·6, 26·3, and 62·5, as compared with 3·6, 1·02 and 7·3 in 1928.

W. F.

EJERCITO (Antonio). **Summarized Report on Malaria Surveys and Control in Mindanao and Sulu.**—*Jl. Philippine Islands Med. Assoc.* 1929. Aug. Vol. 9. No. 8. pp. 277–283.

This paper deals with malaria control by anti-larval measures directed against the principal Philippine carrier, *Anopheles minimus*. The method adopted was weekly hand-spraying with 1 per cent. Paris green, mixed with road-dust which had been passed through a 60-mesh screen. The Paris green consisted of spherical crystals (not amorphous powder) of 8 to 20 microns diameter, and it contained a minimum of 50 per cent. of arsenious trioxide. In addition to *A. minimus*, the following anopheles were found: *maculatus*, *barbirostris*, *hyrcanus*, *rossii* (*vagus*), *rossii* (*subpictus*), *aitheni* (1 and 2), *ludlowi*, *umbrosus*, and an unidentified anopheles which the author describes; he considers that it is a new species.

W. F.

BARBER (M. A.) & KING (C. H.). **Some Notes on the Limitations of Screens in the Prevention of Malaria.**—*Public Health Rep.* 1929. Mar. 8. Vol. 44. No. 10. pp. 523–528. With 2 plates.

An interesting note on prevalent and increasing malaria in a place where screening was common and reasonably thorough. Investigation seemed to show (1) that staying out after dusk and even sleeping out negatived the protection of house screening, and (2) that imperfect screening, far from being worse than useless as is commonly said, did exclude anopheles from the houses to an appreciable extent. In places where anopheles are accompanied by the savage biting mosquitoes, screening is likely to be specially helpful because taken advantage of: "the evening air fortified by such a pungent ingredient as *Aedes sollicitans* may well become unbearable."

J. F. C. H.

MANSELL (R. A.). **An Experiment in the Prophylaxis of Malaria.**—*Jl. Roy. Army Med. Corps.* 1929. Feb. Vol. 52. No. 2. pp. 110–112. With 1 fig. [2 refs.]

The experiment concerned troops moving from the plains to the hills and *vice versa* at mid-season. It had been observed that both parties of troops regularly, year by year, became heavily infected at certain camps in the foothills where they halted during the change over.

Mansell had remarked the observation of YORKE (this *Bulletin*, 1926, Vol. 23, p. 148) that 10 grains of quinine given before, on the day of and for 7 days after an infective feed did not prevent the development of malaria and that the amount of quinine given in such a way was immaterial.

He gave his men 15 grains of quinine twice daily for 8 days, commencing a week after quitting the malarious camps. The result of the first year's trial seems to justify the procedure, there having been a much diminished morbidity from malaria.

J. F. C. H.

MANSELL (R. A.). **Some Answers to the Cantonment Antimalaria Problem.**—*Jl. Roy. Army Med. Corps.* 1929. Sept. Vol. 53. No. 3. pp. 196-201. With 1 chart in text.

During recent years two lakhs of rupees have been allotted annually in army budgets for antimalaria work in cantonments. In support of this expenditure, the author gives graphs and tables showing the rapid and definite fall which has taken place "in one of the most malarious districts in the north of India" since these funds have been available. He states that in four years there has been a saving of 3,287 admissions of British and 1,908 Indian troops to hospital against an expenditure of 1½ lakhs of rupees; though he admits that this reduction may have been not wholly due to antimalaria measures.

W. F.

PARSONS (Albro L.). **Malaria Control at Camp Stotsenburg, P.I.**—*Milit. Surgeon.* 1928. Dec. Vol. 63. No. 6. pp. 816-829. With 2 charts. [1 ref.]

This article emphasizes the well-known fact that however well troops are protected against malaria in their permanent quarters, the exigencies of military service in a malarious area, whether the service be active warfare or peace-time exercises, make it practically inevitable that numerous infections will take place.

The study is notable because it reveals considerable confusion in the classification of the anopheles of the area concerned and consequent difficulty in determining the dangerous species.

One would have liked to know the incidence of the three types of malaria, but the only information is that 1927 was a typical year when "all admissions were for tertian malaria save four aestivoautumnal. Only very occasionally do we find quartan malaria."

Paris green has been used with good effect, but regarding prophylactic quinine "the belief has gained ground that the daily dose of quinine, while keeping the soldier on his feet, in reality only serves to delay his illness—prolong the incubation period."

J. F. C. H.

MOSCHKOWSKI (Sch.). Ueber Chininprophylaxe bei Malaria. [**Quinine Prophylaxis in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 555-566. [Refs. in footnotes.] [Trop. Inst., Moscow.]

The author describes his method of discontinuous prophylactic quinization. The chief questions for consideration are: (1) The sequence of quinine days; (2) the time for administration; and (3) the dose. As regards the first, he recommends administration on two successive days with three days' interval; secondly, the quinine is to be given in the early morning; and thirdly, a moderate therapeutic dose (0.4-0.5 gm.) is indicated. An opportunity of trying out in practice the author's views was afforded in the extensive investigations carried out since 1924 in various districts of the Soviet Republic.

Thus in the summer of 1924, 15,000 soldiers received quinine prophylactically. Amongst the quinized (of which only 66 per cent. regularly received quinine) 11 per cent. became sick during the malaria season, whilst in the non-quinized group, which was in a favourable area, the percentage of sick was 5 times as great. 60 per cent. of the soldiers received the quinine according to the author's scheme in the early morning, the remainder receiving it daily towards the evening. Amongst 1,500 soldiers who had never previously suffered from malaria and were treated prophylactically according to the author's scheme, 5.2 per cent. sickened, whilst in a group of similar strength receiving quinine daily towards evening the sick rate was 6.4 per cent. No great difference, but the advantages of the author's scheme were brought out in other groups, in which only 8 per cent. sickened in course of the malarial season, whilst the number of attacks amongst those treated by the other method was 34 per cent. during the malarial season. Other investigations are recorded. He selected his method on theoretical grounds, after considering all possible combinations; he believes that his scheme of discontinuous administration is the most satisfactory, as the attacks (sporulation of the parasite) fall on fewer quinine-free days than in the other system. He considers that the investigations, carried out under various conditions during the years 1924-1928, favour quinine prophylaxis in general and his method in particular.

E. D. W. Greig.

JAMOT (E.). Note sur des essais de quininisation préventive et curative au Cameroun. [**Prophylactic and Therapeutic Quinization in the Cameroons.**]-*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 555-568.

The inhabitants of 8 villages, numbering 2,424 persons, were examined with the result that parasites were found in 51 per cent.; about half the infections were due to *P. falciparum*. In children under 15 the parasite index was 75 per cent.; in adults it was about 43 per cent. These figures are interpreted to mean that practically everyone was infected. In order to gauge the value of prophylactic quinine in such a population, 586 persons, found free from parasites at the preliminary examination, were given various doses at different intervals. At the end of a fortnight they were re-examined, with the result that 78, or 13 per cent., were found to harbour parasites. At the end of four weeks they were examined again, and parasites were found in 20 per cent. The results in a control group of 582 who received no quinine were in marked contrast. In this group parasites were found in 247, or 42 per cent. a fortnight later, and in 55 per cent. at the end of a month. The author found that the results of giving a prophylactic dose of 1 gram of quinine every 7 days were as good as those which followed daily doses of 0.25 and 0.5 gram.

W. F.

MISSIROLI (A.). Versuchsstation für den Kampf gegen Malaria. Zur Präventivbehandlung mittels Schweinfurtergrün in der Praxis. [**Prevention of Malaria by Paris Green.**]-*Seuchenbekämpfung*. Vienna. 1929. Vol. 6. Nos. 3 & 4. pp. 155-161; 238-244. With 5 text figs.

The work was carried out chiefly at Portotorres in Sardinia and Bianconovo in Calabria. Later it was extended to other parts. In

the first paper the author describes the method of using Paris green as a larvicide. The description is continued in the second paper, which gives also the spleen and parasite indices; these were:—

	Spleen.				Parasite.			
	1924	1925	1926	1927	1924	1925	1926	1927
Bianconovo ...	56.2	54.2	29.2	21.3	17.8	10.3	0.45	0.47
Portotorres ...	46.8	42.4	27.0	27.4	34.2	8.7	5.9	5.5

Operations were commenced in 1925. From this table it is apparent that in two years malaria in Bianconovo has completely disappeared and has rapidly receded in Portotorres. These results are supported by those obtained in other countries where antilarval campaigns with Paris green have been carried out. The antilarval campaign with Paris green can be carried out in the poorest Italian districts. The costs are low.

E. D. W. Greig.

- BUSINCO (Ottavio). Le gastro-enteropatie dei malarici cronici. (Sintesi radio-morfologica e patogenetica).—*Riforma Med.* 1929. Aug. 24. Vol. 45. No. 34. pp. 1142, 1145–1147. [4 refs.] [Inst. of Path. Anat., Univ., Cagliari.]
- EJERCITO (Antonio). Plasmochin and Quinine in the Prophylaxis and the Prevention of Malaria Relapses.—*Jl. Philippine Islands Med. Assoc.* 1929. July. Vol. 9. No. 7. pp. 229–234.
- GUERRA MÉNDEZ (R.). El signo de Pagniello en el paludismo.—*Gac. Méd. de Caracas.* 1929. (25° Aniv. Acad. Nac. de Med. Numero extraord.) pp. 69–70.
- GUPTA (C. R. Das). Cerebral Symptoms caused by *Plasmodium vivax*.—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. p. 507. [School of Trop. Med., Calcutta.]
- GUPTA (S. C. Sen). Temporary Insanity following an Attack of Malaria.—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 507–508.
- LABRANCA (Antonio). La legislazione e l'organizzazione sanitaria per la lotta contro la malaria in Italia.—*Riv. di Malariologia.* 1928. Sept.–Oct. Vol. 7. No. 5. pp. 713–739. [English summary p. 845.]
- LIU (H. L.). Mercurochrome in the Treatment of Malignant Tertian Malaria and Neuralgia following Centipede Bite. Report of Two Cases.—*China Med. Jl.* 1929. July. Vol. 43. No. 7. pp. 706–709. With 2 charts. [Ming-Sun Hosp., Hofei, Anhwei.]
- NAVARRO (Antonio). Esplenectomy por esplenomegalia palúdica dolorosa.—*Semana Méd.* 1929. Oct. 24. Vol. 36. No. 43 (1867). pp. 1161–1164. [1 ref.]
- SERIO (Francesco). Sulla plasmochina nella cura della malaria.—*Riv. di Malariologia.* 1929. July–Aug. Vol. 8. No. 4. pp. 436–448. [14 refs.] [English summary p. 479.] [Med. Clinic, Univ., Catania.]
- VIAR (Juan). Nuevos casos de paludismo indigena en Vizcaya.—*Medicina Paises Calidos.* Madrid. 1929. Sept. Vol. 2. No. 5. pp. 451–452.
- VILLAIN (Georges) & KROUCH (Maurice). Notes cliniques et hématologiques sur le paludisme estivo-automnal en 1928 dans la région de Grombalia (Tunisie).—*Arch. Inst. Pasteur de Tunis.* 1929. June. Vol. 18. No. 2. pp. 202–220. With 3 plates. [4 refs.]
- WILLIAMS, Jr. (L. L.). Current Malaria Studies, with Special Reference to Control Measures.—*Public Health Rep.* 1929. Aug. 16. Vol. 44. No. 33. pp. 2001–2004.

SLEEPING SICKNESS.

LEAGUE OF NATIONS. Health Organisation. **Report of the Second International Conference on Sleeping Sickness held in Paris, November 5th to 7th, 1928.** C.H. 743.—90 pp. With 3 maps in text. 1928. Geneva.

The first portion of this report describing the constitution of the Conference and the recommendations adopted has already received notice [this *Bulletin*, Vol. 26, p. 185].

The next section consists of an address by Mr. Ormsby-Gore, who, after expressing the pleasure of the British delegates in accepting the invitation of the French Government for the Conference to meet in Paris, briefly outlined the present position as regards trypanosomiasis in the various British Colonies in Africa. He referred to the important administrative work which has been done in the Sudan and is now being commenced in Uganda, in regard to the administrative control of African natives threatened with infection, by control of their movements, by the issue of medical passes and the like. For reasons which he mentions no one method can, however, be universally applied, but each administration faced with the problem has much to learn from the experiments carried out by its neighbours. This is true not merely between territories under the administration of different European Powers, but even between different British administrations. Mr. Ormsby-Gore concludes as follows :—

“ If I were asked to sum up what is the main contribution which Europe has henceforward to give to the solution of the problems of the tropics, now that the reign of peace and law has been established, I should say that it is in one sphere of knowledge—bionomics—a knowledge of the laws of life.

“ I take it that the chief object of this Conference is to discuss together how best we can advance our still restricted knowledge of these laws of life by further research and by practical administrative action based upon such limited knowledge as we already possess.”

The third section is a report submitted by the Belgian Ministry of the Colonies on trypanosomiasis in the Belgian Congo. A table is given showing the number of persons examined, and of those punctured, and also of the new cases, old cases, and cases under treatment in the various provinces. This is followed by a brief analysis of the state of affairs in each province. As the work referred to has already been published in various articles which have been summarized in this *Bulletin* further reference is unnecessary.

The fourth article is a memorandum submitted by the British Colonial Office. A brief and interesting summary is given firstly of the tsetse fly investigation going on in Nigeria and Tanganyika, and secondly, of the results obtained in the treatment of cases of sleeping sickness by various workers with various drugs in different parts of Africa. The last portion of the British memorandum consists of a summary of the condition of sleeping sickness questions in various British Colonies and protectorates in 1925, and the progress made in that and the following years. The papers on which this memorandum is based have all received notice in this *Bulletin*.

The fifth article deals with sleeping sickness in the Sudan.

The sixth is entitled “ A Report submitted by the Inspector-General's Office of the Public Health Service of the Ministry of the Colonies of

the French Republic: Campaign against Sleeping Sickness in the French Colonies and Mandated Territories (Togoland and the Cameroons)." This report describes the present organization of the service and the methods employed to stamp out sleeping sickness; it concludes with a résumé of the experiments carried out in recent years at the Brazzaville Pasteur Institute in the treatment of sleeping sickness mainly with tryparsamide and 'Fourné 270.'

The final section is a report by the Directorate-General for Morocco and the Colonies of Spain (Spanish Guinea and Fernando Po).

W. Yorke.

JAMOT (E.). La maladie du sommeil au Cameroun en janvier 1929. [**Sleeping Sickness in Cameroon in January 1929.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 473-496. With 1 coloured folding map.

The mission created in July, 1926, to combat sleeping sickness had as its first objective the precise determination of the extent of the disease. Eight expeditions comprising 150 native orderlies and 70 microscopes and directed by European doctors have devoted two years to this work, and the results of their labours form the subject of the present paper, which deals especially with the foci in the centre, the east, the south and the south-east of the territory.

The distribution of the disease is shown in an excellent map. The area of the infected territory is approximately 80,000 square kilometres and the population is about 800,000, that is about 10 per kilometre; but certain districts are almost without population, so that in the truly inhabited districts the population is much denser. A brief account is given of the nature of the country and of the vegetation.

The disease is by no means evenly distributed throughout the whole of this vast area; in some places its incidence is very great and in others but slight. The author has divided the area into (1) endemic zones in which the number of infected does not exceed 15 per cent, (2) epidemic zones where it is definitely above 15 per cent., and (3) endemo-epidemic zones where the coefficient of infectivity is sometimes below 15 per cent. and sometimes above this figure. The position and size of these various zones is clearly shown in the map. A detailed description of the state of affairs in each of the zones is given.

The next portion of the report deals with results of treatment: the patients are divided into the following four groups:—

1. Old cases in good state without trypanosomes in the blood.
2. Old cases in good or bad condition with parasites in the blood.
3. New cases.
4. Old or new cases in very bad condition.

All the cases, whether new or old, are treated locally.

The drugs mainly used were atoxyl and tryparsamide, and during the years 1927 and 1928, 900 kgm. of atoxyl and 600 kgm. of tryparsamide have been injected in the Cameroons. The old cases have received one or more series of 6 injections of atoxyl or of 10 injections of tryparsamide. In certain very heavily infected villages, the healthy have also been atoxylized. Atoxyl has been usually given subcutaneously in doses of 1.5 cgm. to 2.0 cgm. per kilo., repeated every 10 to 14 days. Tryparsamide was given intravenously in 20 per cent. solution, or

subcutaneously in 10 per cent. solution in doses of 4.5 cgm. per kilo. at weekly intervals. As a rule, the latter drug was reserved for severe cases.

The old cases with parasites in the blood were given novarsenobenzol, emetic, moranyl or tryparsamide or combinations of these drugs.

Atoxyl. The patients treated with this drug received a large dose immediately the diagnosis was made and during the following 3 months a series of 5 or 6 similar injections. Information is given regarding the results obtained in Lomié, where 7,664 patients received this treatment and in Abong-Mbang where 5,516 patients were given it.

Tryparsamide. In the course of the second half of 1926, the use of tryparsamide was commenced in the camp of Ayos and it was given systematically in the hospital, but it was only towards the middle of 1927 that the drug was employed for the treatment of patients in the bush.

In June, 1927, it appeared that the Djem tribe which lives on the road from Abong-Mbang to Lomié, and where DE MARQUEISSAC in January, 1926, found 84 per cent. of the population to be infected, was being exterminated. Of the 2,220 inhabitants found in 1923 only 642 remained and of these 540 were infected. All of these patients, the majority of whom were in a very bad state, had received some months previously a final series of 6 injections of atoxyl, but this was powerless to arrest the mortality. Jamot ordered 10 injections of tryparsamide for each infected person and 5 injections of atoxyl for each healthy person. This treatment arrested the mortality and restored it to normal dimensions.

In the other tribes of Abong-Mbang, the patients in good condition were given atoxyl, and those in bad condition a series of 10 injections of tryparsamide. Up to November 1st, 1928, 25,638 patients had benefited by treatment with tryparsamide.

Referring to the accidents resulting from the use of tryparsamide, Jamot states that of the 135,186 subcutaneous injections of the drug only 284 were followed by abscesses. He adds that provided proper aseptic precautions are taken abscesses never occur.

Of the 25,638 patients treated with the drug 233 (0.8 per cent.) developed ocular troubles. As a rule, these were transient, but in 30 there was persistent amblyopia and in 17 definite amaurosis. The accidents may follow the use of too large doses in advanced cases, and the author believes that it is important to use distilled water in the preparation of the solution for injection; if the solution is not perfectly clear it should be rejected.

The results of treatment with tryparsamide are summarized in a table.

Various attempts at preventive treatment were undertaken. In a very heavily infected region the experiment of BOSSUET and DE TRÉVISE was repeated; the results, which appear to be negative, will be communicated in a later paper. On the contrary, interesting results have been obtained through atoxylization of the healthy in heavily infected villages. In the villages on the road from Abong-Mbang to Djaposten, where the scourge is exceptionally severe, 1,561 healthy persons have each been given 5 large doses of atoxyl at 14-day intervals, whilst the patients in the same villages were treated with tryparsamide. Between 2 and 9 months later BAUGUION revisited the villages and found that of the 1,561 atoxylized 74 (4.8 per cent.)

were infected, and of the 63 who were not atoxylized 33 (52·3 per cent.) were infected. Similar observations were made elsewhere.

The paper closes with a discussion of the effect of treatment on the death rate and birth rate.

W. Y.

BUCHANAN (J. C. R.). **Note on the Trypanosome Infection Rate of Wild Game.**—*Kenya & East African Med. Jl.* 1929. July. Vol. 6. No. 4. pp. 111–113. [6 refs.]

The observations recorded in this note were made in the Rukwa Valley, an epidemic centre of Rhodesian sleeping sickness in the Ufipa district of Tanganyika. Microscopic examination was made of the peripheral blood of 150 animals: the thick drop method was used in every case, but in addition, wherever possible, thin films were used for the identification of the parasites. Subinoculations into laboratory animals were not made. Details are given in tables. Of the 150 animals examined, 31 (20·7 per cent.) were found to be infected. In 18 of these the infection was probably *T. brucei*. Waterbuck appeared to be the most frequently infected, 18 of the 33 examined being found to harbour trypanosomes in the blood.

W. Y.

BUCHANAN (J. C. R.). **Some Clinical Aspects of Trypanosomiasis rhodesiensis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. June 25. Vol. 23. No. 1. pp. 81–88. [6 refs.]

During analysis of a series of 49 consecutive cases of Rhodesian trypanosomiasis, the author was impressed by a great variation in symptomatology and in types of the disease. There appeared to be certain clinical points which had not previously been emphasized. The principal symptoms recorded in the complete series are summarized in a table, which shows at a glance how greatly toxic manifestations predominate over signs referable to central nervous system involvement. This might be taken to imply that, as in the case of *T. gambiense* infections, the central nervous system becomes invaded late in the course of the disease. It is, however, generally recognized that such is not the case, and the findings in ten individuals, whose cerebrospinal fluids were examined within three weeks of the first onset of symptoms, show how really early in the course of the disease this may occur. The condition of the cerebrospinal fluid at the beginning of the illness in these ten individuals is shown in a table. All had greatly increased cell count and in five of the ten trypanosomes were actually found.

Rapid emaciation, weakness, pain and oedema were probably the most obvious signs of toxic action resulting from the trypanosome infection, but a careful observation of the condition of the heart in a series of 74 unselected cases show that there was an important effect on the cardiac system. Of the abnormalities found, irritability, causing an instability of the pulse rate and a degree of tachycardia quite out of proportion to the pyrexia present, was by far the most common. All degrees of cardiac disorder were observed, from simple loss of tone and subsequent weakness of the sound to complete disorganization of rhythm and heart failure.

The author was able to classify his cases into three distinct clinical types. In the first, the disease began suddenly and ran a dramatically

acute course, ending fatally in two or three months in untreated cases. In the second, the onset of the disease was insidious and the course was chronic; in an extreme instance it lasted for some years. The third type, of which only two cases were seen, was characterized by an acute onset with little systemic disturbance, but with symptoms and lumbar puncture findings which proved grave pathological changes to have taken place in the central nervous system.

The author considers that two factors must determine the type of the disease which will develop in any particular case, viz., individual resistance and virulence of the infecting trypanosomes. The paper concludes with a discussion of these two factors.

W. Y.

REGENDANZ (P.) & HOEPLI (R.). Die Einwanderung der Trypanosomen in das Gewebe und die dadurch bewirkten histopathologischen Veränderungen. [**The Migration of Trypanosomes into the Tissues and the Histopathological Changes produced.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. July. Vol. 33. No. 7. pp. 376–387. With 4 text figs. [11 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

After briefly reviewing the literature of this subject, the authors pass to a description of the histopathological changes found by them in the heart of monkeys, the eyes of rats, and the brain of a hamster infected either with *T. gambiense* or *T. rhodesiense*.

The following are the conclusions:—

1. The histological changes in the hearts of monkeys infected with *T. gambiense* and *T. rhodesiense* are described; they relate to pericarditis and myocarditis produced by the trypanosomes.

2. The trypanosomes present in the pericardial fluid cause an inflammation of the pericardium and subsequently inflammation of the heart muscle, which is accompanied by marked increase of fluid between the muscle bundles. After such damage to the epicardium it is possible for the parasites to wander into the tissue; here they multiply and produce definite damage to the tissue.

3. Trypanosomes can wander into the anterior chamber of the eye and multiply there. As a result changes appear in the cornea, iris, and lens. These changes are accompanied by oedema and inflammation of the conjunctiva.

4. The trypanosomes wander out of the fluid in the anterior chamber into the inflammatory oedema of the conjunctival tissue and finally appear in the conjunctival sac.

5. In the fluid of the conjunctival sac living trypanosomes may be found in great numbers when they are present in only scanty numbers in the peripheral blood.

W. Y.

GRAF (H.). Report on Four Cases of Trypanosomiasis occurring in Europeans of the British Cameroons.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. June 25. Vol. 23. No. 1. pp. 95–100. [1 ref.]

Notes are given of four cases of sleeping sickness, all of which presented unusual features. In each case, the Glossina bite which initiated the disease was accompanied by marked constitutional disturbances. None of the patients had actually felt the bite, but in all four the external appearances of the swellings clearly pointed to an

insect as the cause. Case I is particularly interesting in that it occurred in a European, who was on his first visit to the Tropics, and who had arrived in the Cameroons only two weeks prior to the bite which, in the author's opinion, was the undoubted cause of the infection; marked constitutional disturbances occurred immediately after and continued unabated until the appearance of the secondary symptoms. In Case 2, the author succeeded in demonstrating the presence of trypanosomes in the actual lesion produced by the bite. In three of the cases, trypanosomes were found in the blood stream within a few days of the bite that apparently initiated the disease. Unfortunately, the author was unable to decide whether the parasite in these cases was *T. gambiense* or *T. rhodesiense*.

W. Y.

SHELLEY (H. M.). **Report on a Case of Human Trypanosomiasis.**—*Nyasaland Protectorate Ann. Med. Rep. on the Health & Sanitary Condition for Year ending 31st December, 1928.* Appendix III. pp. 41-42.

Details are given of a case of trypanosomiasis in a European aged 32, who contracted the disease in Portuguese East Africa. The author states that the following were interesting features of the case:—

"1. The dusky red macular rash on the anterior surface of the chest and abdomen, when first admitted to hospital.

"2. The development of a bilateral orchitis, lasting one week. Another case of human trypanosomiasis in this country also developed a bilateral orchitis during treatment.

"3. The occurrence of the typical circular erythematous rash 29 days after the commencement of treatment, and despite the fact that the patient had received 5.5 grammes of tryparsamide and 2 grammes of Bayer 205.

"4. The apparent resistance of the parasites in the peripheral blood to tryparsamide and their rapid disappearance after one gramme of Bayer 205.

"5. The haemoptysis of four ounces of blood, the patient having no signs of tuberculosis."

W. Y.

SICÉ (A.). *Alternance de l'infection sanguine chez quelques trypanosomés.* [**Alternation of Blood Infection in Human Trypanosome Infections.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 666-668. [Pasteur Inst., Brazzaville, French Equatorial Africa.]

The observations recorded in this paper were made on 12 patients, none of whom had received any previous form of treatment. It was decided to give them at Brazzaville a new biological treatment devised by one of the sleeping sickness doctors, the nature of which is not disclosed. The product used was found to have no trypanocidal power. Special attention is drawn to the alternate presence and absence of trypanosomes in the blood of the patients; the method of examination was always triple centrifugation.

Before treatment trypanosomes were found on gland puncture in 8 of the cases, but only two had the parasites in the blood. Twenty-four hours later trypanosomes were found in the blood of six cases. The results of seven examinations of the blood of 12 cases between the 3rd and 12th of August are shown in a table. It is seen that in only

two were trypanosomes found regularly in the blood; in nine cases they were sometimes present and sometimes absent. The remaining case in which trypanosomes were never found was rejected, as on August 8th *Sp. duttoni* were discovered in the blood.

BLANCHARD (1913) has already drawn attention to the spontaneous variations in the blood infection of four cases of sleeping sickness, and the present table confirms his observation. The author considers that these facts indicate the necessity of not limiting attention to the blood when attempting to make a diagnosis of trypanosomiasis, but of also performing gland puncture and lumbar puncture.

W. Y.

MACLEAN (George). **Notes on Treatment of Fifty-Two Cases of Rhodesian Trypanosomiasis with Bayer 205 and Tryparsamide.**—*Ann. Trop. Med. & Parasit.* 1929. Nov. 8. Vol. 23. No. 3. pp. 337–344. [1 ref.]

The author describes the results of treatment during an outbreak of human trypanosomiasis in the Ufipa District of Tanganyika Territory. The species of tsetse responsible was *G. morsitans*, and the acute nature of the disease, together with the finding of posterior nuclear forms in subinoculated rats, indicate that the disease was of the Rhodesian type. In all, 52 cases (diagnosed microscopically) were treated between November, 1924, and December, 1925. All the survivors were kept under observation until 1928.

The following are the conclusions :—

“ Generally speaking, the earlier the treatment the better the chances of recovery. There is good reason to expect that an uncomplicated case taken in the first two or three weeks of infection will make a complete recovery, if given four grammes of Bayer 205 in three or four doses, the treatment being spread over a month. To allow a margin of safety it may be advisable to administer as much as eight grammes, but if this is done the urine should be watched daily for albumen. How far Bayer 205 should be withheld when albuminuria occurs is a matter for judgment in each individual case, but generally the treatment should cease until the albumen disappears if three grammes have already been given, but should not be withheld for more than ten or fourteen days if only two grammes or less have been given. An individual dose should not ordinarily exceed one and a half grammes. The optimum total dosage of Bayer 205 is not known, and a series of late cases on a prolonged course of treatment should be worth observing.

“ Tryparsamide alone, though not generally regarded as satisfactory in this type of sleeping sickness, has given good results in some cases and would seem to deserve further trial. Solutions of this drug should always be made in distilled or freshly-collected rain water, and the solution should not be allowed to stand long or heated beyond blood heat. Should dimness of vision occur, treatment should cease until the sight is completely restored.

“ Treatment by Bayer 205 followed by Tryparsamide gives better results than Bayer 205 alone. When the combined treatment is being given Bayer 205 should be administered in the same way as when the drug is given alone and after this course Tryparsamide should be given in 2 or 3-gramme doses at weekly intervals (with or without a month's interval between the fourth and fifth, and the eighth and ninth injections) until at least 36 grammes are given. What interval should elapse between the last dose of Bayer 205 and the first dose of Tryparsamide is still a matter of conjecture, but a month has been found suitable.

"In the above series children generally reacted badly to treatment, but this may possibly be because the doses were too small. It has since been found that children tolerate both drugs extremely well.

"It is important that a series of treated cases who are in good health but whose cerebro-spinal fluid remains abnormal for several months after completing treatment, should be given a further course of tryparsamide without waiting for the development of any symptoms. These could then be compared in years to come with cases that had not been so treated.

"Work on the infectivity of Trypanosomes in relapsed cases is urgently needed."

W. Y.

VAN DEN BRANDEN (F.). Au sujet de l'arsénorésistance dans le traitement de la trypanosomiase humaine par le tryponarsyl. [**Arsenic Resistance in the Treatment of Human Trypanosomiasis by Tryponarsyl.**—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 540-542.]

The work is a rejoinder to the paper of BARLOVATZ [see this *Bulletin*, Vol. 26, p. 708] dealing with arsenic resistance in the treatment of human trypanosomiasis with tryponarsyl [Belgian tryparsamide]. Experience has shown that for patients with normal spinal fluid a course of at least 30 gm. of tryparsamide is necessary. As regards patients with altered spinal fluid it is the condition of the fluid which should be the guide to treatment and criterion of cure of the patient. BARLOVATZ rarely records the state of the spinal fluid before treatment or at the periods of interruption of treatment, and the latter are usually untimely. There is likewise no record of the amount of albumin in the fluid and this is a matter of great importance.

The author has sometimes given up to 200 gm. of tryponarsyl without interruption in unfavourable cases, with amelioration of the general health and condition of the spinal fluid. BARLOVATZ has given quite inadequate doses with which it is possible to expect a cure. Patients insufficiently treated rapidly relapse and the method employed by BARLOVATZ with long interruptions undoubtedly favours the production of arsenic resistance.

W. Y.

WILSON (D. E.). **A Trial of Three Preparations made by the British Dyestuffs Corporation Ltd. in the Treatment of Trypanosomiasis in African Natives (*T. rhodesiense*).**—*Jl. Trop. Med. & Hyg.* 1929. Nov. 1. Vol. 32. No. 21. pp. 305-309. [1 ref.]

The three preparations referred to are (1) Fournau 309, (2) Sample 2, and (3) Sample 3. They were received from the British Dyestuffs Corporation, Ltd., in order that their trypanocidal action in man might be tested. The tests were carried out in one of the sleeping sickness hospitals in Tanganyika Territory. The patients were unselected and had had no previous treatment. Three cases were treated with each drug and details are given.

The following are the conclusions :—

"Of the three substances tested Fournau 309 (B.D.C.) was the only one which showed any trypanocidal action. As far as I am aware this is the first time that a British preparation of Fournau 309 has been used in the treatment of human trypanosomiasis (*T. rhodesiense*). Its action on the three cases in which it was employed was quite equal to that of Bayer 205 or the French preparation Fournau 309.

"It seems rather extraordinary that two compounds so closely related, namely (B.D.C. Fourneau 309 and Sample 2 and 3) should show such marked differences in their trypanocidal action.

"Fairbrother and his colleagues (1925) found a similar difference in trypanocidal action between Fourneau 309 and some preparations of apparently closely allied chemical constitution in experiments on mice infected with *T. equiperdum*."

W. Y.

MACLEAN (George). **The Action of Präp. 3510 in Rhodesian Sleeping Sickness.**—*Ann. Trop. Med. & Parasit.* 1929. Nov. 8. Vol. 23. No. 3. pp. 345-348.

The drug in question was obtained from the firm of I. G. Farben-industrie A.G., Höchst-am-Main, Germany. It is known as Präp. 3510, and is a white powder easily soluble in water. It is stated to be an arsenical compound, but the formula is not disclosed. The drug is made up in ampoules containing 1 to 2.5 gm. ; no information was given regarding doses.

Three cases were treated in April and May 1928 ; two were very advanced, but the third patient was comparatively robust. The result was not successful, as all the patients died. The author believes that death in the third case was probably accelerated by the drug. Details of the three cases are given. The first case received 3.75 gm. of the drug intravenously ; the second 2.5 gm. intramuscularly. The first two cases died on the 6th and 8th day, respectively, after treatment. The third case was given 2.25 gm. intramuscularly on the 1st day and 2 gm. on the 7th day ; he died on the 10th day.

As the observations made on these cases appear to suggest that the drug had a definite trypanocidal action, it was decided to continue the observations under modified conditions. A fourth case was accordingly selected and 1 gm. of Bayer was given to sterilize the blood. A week later 2 gm. of Präp. 3510 was given intravenously. There was little or no reaction and the patient was able to tolerate eight similar weekly injections without untoward symptoms and with very good clinical results. Nine months later he was, except for some pains in the legs, very well and was able to do heavy muscular work.

The conclusions are as follows :—

"The limits of the pharmacological dose of Präp. 3510 in man are not known, but there is reason to suspect that its action is much more toxic if there are large numbers of trypanosomes in the peripheral circulation when it is administered.

"It has proved much less efficacious than either Bayer 205 or Tryparsamide in moderate doses. While it may possibly be an efficient trypanosomicide in larger doses the margin of safety is so narrow that it is of no practical value when administered alone. Its action in association with Bayer 205 is being observed, but it will probably take some years before any definite conclusions can be arrived at about this method of treatment.

"The drug is well worth a trial in the various trypanosomiasis of domestic stock."

W. Y.

COGHLAN (Bernard A.). **A Report on "BR. 68" in the Treatment of Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 197-199.

Two series of cases of Rhodesian sleeping sickness were treated with "BR.68." The first series consisted of six consecutive patients

arriving at the hospital (Tanganyika). Four of these had previously received treatment and two were fresh cases, both rather in an advanced stage. In the fresh cases three injections of 0.3 gm. and two of 0.6 gm. were given at weekly intervals. Two of the relapsed cases were similarly treated and two received four injections of 0.3 gm. and only one of 0.6 gm. The fresh cases were advanced; the blood was swarming with trypanosomes, and the cerebrospinal fluid was infected in both instances. The first injection produced a severe reaction, but the blood was still positive 24 hours later. On the second day the blood was negative, and continued so in one case for five days and in the other for twelve days. The subsequent injections caused the trypanosomes to disappear for a few days, but they invariably reappeared in the blood within a week, even when the dose was doubled. The relapsed cases seemed to improve at first, but the improvement was not maintained after the first two injections. The results were considered to be so bad that the drug was abandoned and the patients given a course of Bayer 205 and tryparsamide; their subsequent improvement was in marked contrast to their previous progress.

The second series of patients were also unselected, but they were all fresh infections. They were given 0.1 gm. of Bayer 205, followed by nine injections of BR.68 (six injections of 0.3 gm. and three injections of 0.6 gm.). Two patients died within two months of receiving the last BR.68 injection. Under the Bayer treatment they had considerably improved.

The general conclusion reached is that BR.68, although it has some action, cannot be considered to be a very useful addition to the list of trypanocidal drugs.

W. Y.

VAN DEN BRANDEN (F.). Essai de traitement de la trypanosomiase humaine chronique par le novatoxyl. [**Treatment of Chronic Human Trypanosomiasis by Novatoxyl.**]*—Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 431-435. [Léopoldville Lab., Léopoldville.]

This paper describes the attempt to treat cases of human trypanosomiasis with a new German preparation, "Novatoxyl," i.e., the sodium salt of paraphenyglycinamido arsenic acid. The amount of drug available being very limited, it was decided to limit observations to four chronic cases.

Having no definite instructions regarding dosage, the author began with doses of 1 gm. and 1.5 gm. and subsequently found that he could give with impunity weekly doses of 2 gm. With a view to ascertaining the speed with which the peripheral blood was sterilized, six cases with trypanosomes in the blood were given a single intravenous injection of from 1 to 2 gm. of the drug; it was found that peripheral sterilization was produced by a dose of 2 gm. in approximately 10 hours.

Details are given regarding the treatment of the four chronic cases, all of which exhibited profoundly altered spinal fluid, with greatly increased lymphocytes and albumin. In one case the formula became normal after the patient had received 57.5 gm. of the drug; in two cases which received respectively 54 gm. and 53 gm. of the drug, the spinal fluid and general condition became very greatly improved; and in the fourth case, although there was a diminution in the lymphocytosis and quantity of albumin, the clinical condition did not improve.

None of the patients exhibited ocular trouble. The author concludes that although he cannot draw definite conclusions from four cases, there seems to be evidence that the drug has an action comparable to that of tryparsamide and tryponarsyl.

W. Y.

LAUNOY (Léon), NICOLLE (Pierre) & PRIEUR (Marie). Détermination des doses liminaires préventives du composé 205-Bayer-309-Fourneau dans quelques trypanosomiasés expérimentales. [**Determination of the Minimum Preventive Dose of Fourneau 309 in Experimental Trypanosomiasis.**]—*C.R. Soc. Biol.* 1929. June 28. Vol. 101. No. 22. pp. 650-653. With 1 graph in text. [1 ref.]

During the last year the authors have performed a large number of experiments with the object of ascertaining as exactly as possible the relationship between prophylactic doses of Fourneau 309 and the duration of the refractory period resulting. They have employed for this purpose mice, cats and guineapigs, and *Trypanosoma brucei*, *T. evansi* and *T. equiperdum*.

For the mouse the minimum preventive dose is defined as the smallest dose capable of protecting the animal for 30 to 40 days against one of the above-mentioned infections. In the cat the disease runs a slower course and it is necessary to modify this definition. For this animal the authors regard the minimum preventive dose as the smallest quantity of the drug which will protect the animal for about 60 days; the duration of protection is determined by the number of days elapsing between the injection of the drug and the date of the last of a series of inoculations of the virus which failed to infect.

The results of experiments with mice are summarized in a table and a chart, and those performed on the cats are given separately in detail.

The following are the conclusions :—

1. In experimental trypanosomiasis of the mouse and cat the duration of the refractory period is proportional to the dose of the drug injected, at least in so far as the minimal and subminimal doses are concerned; with larger doses this no longer appears to be exact.

2. Subminimal doses only produce a refractory period of short duration; nevertheless, they may give rise to a peculiar condition of the animal which enables it to resist the infection for a long time and even to recover from it spontaneously. This is true both for mice and cats.

This result seems to indicate that the refractory state created by Fourneau 309 against experimental trypanosomiasis cannot be explained simply by the presence of the drug in the circulation or in the tissues.

W. Y.

LEUPOLD (Frida). Die Verhütung einer Bayer 205-Festigkeit im simultanen Kombinationsversuch. [**The Prevention of Resistance to 'Bayer 205' in Simultaneous Combination Experiments.**]—*Arb. a.d. Staatsinst. f. Exp. Ther. u.d. Georg Speyer-Hause zu Frankfurt a.M.* 1928. No. 21. pp. 110-119. [1 ref.] [Georg Speyer House, Frankfurt a.M.]

The following are the conclusions :—

Trypanosomes experience, as the result of prolonged treatment with subtherapeutic doses of a trypanocidal substance, a change in their chemoreceptor apparatus, which expresses itself by the fact that they are no longer damaged by maximal doses of the drug; they have in fact become drug-fast.

Arsenic, antimony and dye-fast strains are insensitive to 'Bayer 205'; and can in a short time, like a normal trypanosome strain, become fast to the drug.

Simultaneous treatment of trypanosomes with two chemically different trypanocidal substances (arsacetin and tryparosan, arsacetin and trypaflavin) accelerates in general the diminishing avidity taking place in the chemo-receptor apparatus, and leads to absolute resistance to both drugs.

On the contrary, there occurs in the combined treatment of 'Bayer 205' with arsacetin on the one hand, and with tryparosan or trypaflavin on the other, a hypersensitiveness of the trypanosomes to 'Bayer 205,' so that considerably reduced doses exert a sterilizing action.

In simultaneous combination experiments of 'Bayer 205' with arsacetin, tryparosan or trypaflavin, a pronounced retardation of the process of drug habituation can be seen.

W. Y.

COLLIER (W. A.) & KRAUSE (Magdalene). Ueber die Wirkung eines unlöslichen Arsenpräparates auf die Trypanosomeninfektion der weissen Maus. [**The Action of an Insoluble Arsenic Preparation on a Trypanosome Infection in White Mice.**—*Ztschr. f. Hyg. u. Infektionskr.* 1929. Oct. 12. Vol. 110. No. 3. pp. 516-521. [4 refs.] [Robert Koch Inst., Berlin.]

Experimental investigations have shown that certain substances insoluble in water have a pronounced action in certain diseases. It appeared of interest to ascertain whether insoluble arsenicals had any curative action. For this purpose the authors used an arsenical pyridin preparation 'BR 34 a' of BINZ and RATH. This substance is closely related to 'BR 34.'

From the experimental work, which is set forth in detail, it appears that the insoluble 'BR 34 a' exerts a definite influence on mice infected with *T. brucei*. The drug had a prophylactic action if given not more than 2 days before inoculation of the trypanosomes. Similarly, subcutaneous injection of 1 cc. of a 1/2000 concentration in olive oil 30 minutes after the inoculation of trypanosomes prevented infection. The chemotherapeutic ratio was found to be 1:20. The action of the drug was equally favourable when given 24 hours after the inoculation of trypanosomes and at a time when parasites could actually be seen in the peripheral blood. Toxic doses of the drug injected into the muscles of rabbits gave rise to no inflammatory lesions.

W. Y.

RICHTER (Charles) & GLEY (Pierre). Sur la toxicité de certains composés arsénicaux vis-à-vis du trypanosome *in vitro*. [**The Toxicity of Certain Arsenical Compounds for Trypanosomes in Vitro.**—*C.R. Soc. Biol.* 1929. July 5. Vol. 101. No. 23. pp. 802-804.

The authors have attempted to measure the therapeutic activity of arsenical compounds by ascertaining in what dilution they are toxic to the trypanosomes *in vitro*.

The observations were made in Ringer-Locke solution with a pH of between 7.2 and 7.4. A solution of novarsenobenzol 1:10,000 is made in this fluid. A series of 11 haemolysis tubes is selected; into the 1st is put 10 drops of the 1:10,000 solution of novarsenobenzol, into the 2nd 9 drops and so on. Tube No. 2 receives one drop of Ringer-Locke, Tube No. 3, two drops and so forth. The eleventh tube contains 10 drops of Ringer-Locke and serves as the control. To each tube is then added 1 drop of the

blood of a mouse infected with *T. brucei*. A drop of the fluid is examined microscopically at frequent intervals to see whether the trypanosomes are living or dead. An arbitrary time limit of 30 minutes is fixed, and if the parasites are found to be living in one dilution at the end of this time the authors consider that they resist this dilution.

The results are given in a table. The pentavalent arsenicals studied had no action and '606' was not soluble in a liquid of pH 7.2 to 7.4.

In a later paper the authors propose to compare the results obtained by this method with those they have obtained *in vivo*.

[No mention is made of the temperature at which these *in vitro* experiments were conducted. Thirty minutes seem to be an absurdly short period on which to base conclusions: probably, however, it was enforced by the fact that the controls did not live much beyond this time. Nothing is said about the length of life of the controls.]

W. Y.

ROSKIN (Gr.) & ROMANOWA (K.). Arzneimittel und ultraviolette Strahlen. II. Mitteilung. Die kombinierte Wirkung von ultravioletten Strahlen und Novarsolan auf *Trypanosoma equiperdum*. [Medicaments and Ultraviolet Rays. II. The Combined Action of Ultraviolet Rays and Novarsolan on *T. equiperdum*.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 62. No. 1/2. pp. 158–163. [3 refs.] [Microb. Research Inst., Education Commissariat R.S.F.S.R. Moscow.]

The following summary is given:—

1. The doses of novarsolan used, viz., 1:2000, 1:3000, and 1:4000 did not cure infection caused by the authors' strain of *T. equiperdum*.

2. The same doses of novarsolan, when followed immediately by an application of ultraviolet rays, produced complete sterilization of the mouse organism.

3. Smaller doses of novarsolan, e.g., 1:5000 and 1:6000, followed by ultraviolet rays were not, in most cases, followed by sterilization, but the relapse was definitely delayed.

W. Y.

VENTURI (Luigi Carlo). Il naganol ed il moranyl nella cura della tripanosomiasi umana ed animale. Ricerche sperimentali in vitro sopra un tripanosoma umano e tripanosomi animali. [Naganol (Bayer 205) and Moranyl (Fournau 309) in the Treatment of Trypanosomiasis. Experiments *in vitro* with One Human and Several Animal Trypanosomes.]—*Arch. Ital. Sci. Med. Colon.* 1929. June 1. Vol. 10. No. 6. pp. 248–255. English summary p. 255. [Inst. of Trop. Path., Univ., Bologna.]

Blood was taken from the ears of guineapigs infected with *T. cruzi*, *T. maroccanum*, *T. evansi*, *T. cameli*, *T. equinum* and *T. brucei* and placed in well-slides with dilutions of 1/10, 1/20, 1/50, and 1/100 of Bayer 205 and Moranyl respectively, and the effects watched for 1–3 hours. According to the action of the drug the parasites lost motility and collected round groups of corpuscles, and formed themselves into groups; occasionally only did they lie singly. The protoplasm then became granular, vacuolated, and the parasites disintegrated. The different species reacted differently, *T. brucei* proving the least resistant, *T. evansi* the most. No difference

was detected as regards the two drugs, which in fact are said to be chemically identical. [Tables are given, presumably to illustrate the results generalized in the letterpress; they consist of figures, but unfortunately no reference can be found as to what the figures imply.]

H. Harold Scott.

HIRSCHFELDER (A. D.) & WRIGHT (H. N.). **Is Schnitzer's "Interference" between the Action of Two Chemotherapeutic Substances due to Surface Reactions?**—*Proc. Soc. Experim. Biol. & Med.* 1929. June. Vol. 26. No. 9. pp. 789-790. [2 refs.] [Pharmacol. Dept., Univ. of Minnesota, Rochester.]

BROWNING and GULBRANSEN discovered the remarkable fact that, although basic fuchsin cured rats infected with trypanosomes, and acriflavine had the same effect, if animals previously fed with basic fuchsin were infected with fuchsin-fast trypanosomes, and later acriflavine was injected, the therapeutic action of acriflavine was prevented and the animals died of trypanosomiasis. This action was referred to as the "Interference phenomenon." SCHNITZER confirmed these observations both with fuchsin-fast and with normal trypanosomes, and showed that it applied also to other triphenyl methane dyes, e.g., methyl violet and brilliant green, and to arsenicals, e.g., arsphenamine and arsacetin.

As these observations seem to raise fundamental questions in chemotherapy, it is of importance to determine whether they can be explained as merely surface reactions upon the trypanosomes or whether we must have recourse to more abstruse processes of metabolism or vital phenomena.

The authors investigated whether a similar interference could be demonstrated upon the growth and CO₂ production by yeast in the test tube. They found that yeasts which have been definitely stained with methyl violet or by brilliant green, in solutions too weak to affect the CO₂ production, are less sensitive to acriflavine than are normal yeast cells; and vice versa yeasts stained similarly with acriflavine are less sensitive to methyl violet and brilliant green. The effect was not noticeable with basic fuchsin.

It is considered that these experiments represent a complete parallelism *in vitro* to Browning's and Schnitzer's 'interference phenomenon' *in vivo* and render it probable that the latter can be explained as a simple surface reaction.

W. Y.

BRUSSIN (A. M.). Zur Frage ueber das Phänomen der Interferenz. [**On the Interference Phenomenon.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Aug. 1. Vol. 62. No. 5/6. pp. 424-436. [13 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

The following are the conclusions:—

1. The interference phenomenon, as described by BROWNING and GULBRANSEN, occurs not only in infections with *T. brucei* (Strain Prowazek), but also in infections with other trypanosomes.

2. Intensity of the interference phenomenon is, under optimum conditions of experiments, not equal; it is determined by the trypanosome species and the individual properties of the macro-organism.

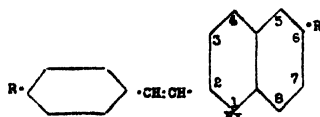
3. The interference phenomenon is in no way influenced by blocking of the reticulo-endothelial system.

W. Y.

BROWNING (C. H.), COHEN (J. B.), ELLINGWORTH (S.) & GULBRANSEN (R.). **The Trypanocidal Action of Some Derivatives of Anil and Styryl Quinoline.**—*Proc. Roy. Soc.* 1929. July 4. Ser. B. Vol. 105. No. B735. pp. 99–111. [4 refs.] [Med. School, Leeds, & Path. Dept., Univ., & Western Infirmary, Glasgow.]

This paper deals with the trypanocidal action of an extensive series of anil- and styryl-quinolines, the bactericidal action of which has been recorded previously [*Proc. Roy. Soc.*, Ser. B, Vol. 100, p. 293 (1926); Vol. 103, p. 404 (1928)].

The anilquinolines have in general but little trypanocidal action, cure being effected by only one of those tried, viz., 2(p-dimethylamino-anil)-6-chloroacetyl-aminoquinoline methochloride and then only at the maximum tolerated dose. The styrylquinolines on the contrary are more effective, and also more toxic. Those tested may be represented by the following general formula :—



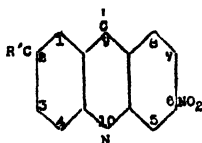
The conditions for effective trypanocidal action appear to be the simultaneous presence of an acylamino-group in either nucleus (i.e., at R or R₁) and of a primary (NH₂), or a tertiary (e.g., dimethylamino N(CH₃)₂) amino-group in the other, i.e., at R₁ or R. The nature of the quarternary group, X, is only important as affecting solubility. The two best trypanocides found were No. 8 [2(p-aminostyryl)-6-acetyl-amino-quinoline methochloride] which occasionally cured in doses of one fiftieth of the maximum tolerated, and No. 90 [2(p-acetyl-amino-styryl)-6-dimethylaminoquinoline methochloride] which appears to be equally good, with the exception that No. 8 also exerts some prophylactic action. No. 90 has but little trypanocidal action *in vitro*. Neither is absorbed from the alimentary tract. Resistance provoked by non-sterilizing doses of No. 90 was associated with high resistance to other trypanocides, except germanin and trypan-blue. The tests were carried out on mice infected with *T. brucei*, but Nos. 8 and 90 were also tried successfully in rabbits, Prowazek and ferox strains of *T. brucei* being used as in the tests with mice. No. 90 is rapidly removed from the circulation; thus, two minutes after an intravenous dose of 0.002 gramme per kilo to a rabbit, the substance cannot be detected in the blood. Urine from rabbits which have received No. 90 contains either the unchanged substance or an active derivative, since an alcoholic extract of the urine exhibits trypanocidal action.

T. A. Henry.

SCHNITZER (R.) & SILBERSTEIN (W.). Ueber neue trypanocide Acridinfarbstoffe. Untersuchungen an homologen Reihen von 6-Nitro-9-Aminoacridinen. [On New Trypanocidal Acridine Dyes. Investigations on Homologous Series of 6-Nitro-9-Aminoacridines.]—*Ztschr. f. Hyg. u. Infektionskr.* 1929. Apr. 8. Vol. 109. No. 3 & 4. pp. 519–531. [6 refs.] [Robert Koch Inst., Berlin.]

The fact that acriflavin (3 : 6-diamino-10-methylacridinium chloride) introduced by EHRLICH and BENDA as a trypanocide, has found

employment almost wholly as a bactericidal agent is typical of the way in which in recent years chemotherapeutical work on acridine derivatives has acquired a bactericidal rather than a trypanocidal objective. Among the numerous new acridine derivatives investigated by the authors only the 6-nitro-9-aminoacridines are dealt with in this paper, the principal interest of which lies in the demonstration of the effect of the nitro-group in position 6, in enhancing the trypanocidal action and of the further favourable effect brought about by the substitution of a doubly alkylated amino-group for a hydrogen atom in the amino-group in position 9. The formula shown below will serve as a general representation of the structure of the compounds dealt with.



In this formula the .NHR in position 9 is such a substituent as the dimethylaminooxypropylamino-group .NH.CH₂.CHOH.CH₂.NMe₂, whilst R₁ in position 2 is an alkyloxy group, such as methoxyl, (.OMe). The technique employed in the tests and the results obtained in a number of typical instances are tabulated in the original but as the object of the paper appears to be to direct attention to 6-nitro-9-aminoacridine as a basis for the synthesis of trypanocides, it will probably be sufficient to summarize the authors' conclusions as to the effect of various side-chains substituted in this nucleus, on the trypanocidal action. The doubly alkylated basic side chain (R) may either replace a hydrogen atom in the amino-group at position 9 or it may be directly attached to the carbon atom in position 1. Within a group of substances in which R has the same composition and position, modification of the trypanocidal action can be brought about in most cases by variation of R₁ (position 2) thus a 2-ethoxy-compound is usually less active than a 2-methoxy-compound and the latter less active than one in which there is no side-chain in position 2.

Toxicity and therapeutic effect do not always run on parallel lines. In some groups the most toxic members are also the most effective therapeutically, in others only the possibility of large dosage permits of the exhibition of any therapeutic effect. It is, however, possible by variation of the side-chains within the limits described above to achieve a favourable adjustment between the two. Thus the substance numbered 3043a, which has a glycyldiethylaminoethylamino group, probably CH₂.NH₂.CO.CH₂.CH₂.NEt.CH₂.CH₂.NH₂, in position 9 and an ethoxyl group (.OC₂H₅) in position 2, has a therapeutic index 1/20 to 1/50 and is moreover one of the few instances in which ethoxyl is more effective than methoxyl in position 2. These substances are slow in action taking about 24 hours to sterilize the blood of a trypanosome-infected mouse. Trypanosomes which had become fast to acriflavin showed a definite, but diminished, susceptibility to some of the new compounds, indicating that resistance of this kind is probably confined to a portion of the molecule and is not to be regarded as resistance to acridine compounds in general.

T. A. Henry.

ARNAUD (R.). Technique nouvelle de dosage des albumines rachidiennes. [**New Technique for Estimation of Albumin in Cerebro-spinal Fluid.**—*Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. p. 337.]

The determination of the albumin in cerebro-spinal fluid is such an everyday occurrence in sleeping sickness work that the discovery of a simple and rapid method is a matter of importance. The present method, which consists in the precipitation by hot trichloroacetic acid, requires five hours to give the result.

The method recommended by the author consists in the precipitation of albumin at ordinary temperatures by the following reagents:—

Acetic acid	...	...	...	5.0 cc.
Carbon tetrachloride...	...	...	...	1.5 cc.
Alcohol, 95 per cent.	...	...	...	24.0 cc.

The mixture should be well shaken and preserved in a coloured and stoppered bottle. The technique consists in pouring 4 cc. of the cerebrospinal fluid into a Sicard's tube and adding at least 1 cc. of the reagent. At the zone of contact of the two fluids there is a milky precipitate; the tube should then be stoppered and the two fluids well mixed. The results should be read after 20 minutes in the usual way.

It is claimed that the results are comparable with those yielded by the classical procedure, that the precipitate is even more regular and consequently the reading easier, and that it saves at least 4½ hours.

W. Y.

SICÉ (A.) & BOISSEAU (R.). Quelques résultats obtenus avec la technique nouvelle de dosage des albumines rachidiennes. [**Results obtained with the New Technique for the Estimation of Albumin in C.S.F.**—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 679–681. [1 ref.] [Pasteur Inst., Brazzaville, French Equatorial Africa.]

The authors record the results of a comparison of ARNAUD's new method (above) of estimating the albumin in the spinal fluid with the old method. Their results, which are given in a table, show that Arnaud's method invariably gives distinctly lower values than does the classical method. In the case of normal spinal fluids and those containing but slight excess of albumin the differences, although marked, are not of great significance; but as the quantity of albumin increases so do the differences in values obtained.

The conclusion reached is that Arnaud's new method does not constitute any advance and should not replace the classical method of employing hot trichloroacetic acid for five hours.

W. Y.

YORKE (Warrington), ADAMS (A. R. D.) & MURGATROYD (F.). **Studies in Chemotherapy. I. A Method for maintaining Pathogenic Trypanosomes Alive in vitro at 37° C. for 24 Hours.**—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 501–518. [8 refs.]

The following summary is given:—

"1. As a preliminary step in an investigation of the mechanism of the action of drugs in experimental trypanosomiasis, it appeared desirable to study the action of the drugs in question *in vitro*.

" 2. For this purpose it was obviously necessary to discover some means whereby pathogenic trypanosomes could be preserved alive *in vitro*, in approximately undiminished numbers, at 37° C. over a period of at least 24 hours.

" 3. The efforts of previous investigators in this direction had not met with much success. It was, however, generally agreed that serum was the best medium, and that it was much easier to keep the parasites alive at laboratory temperature than at 37° C. It is not possible to obtain from this work information having any pretence to quantitative value, and so far as work at the body temperature is concerned, the only statement we have been able to discover of any real value is that of Rothermundt and Dale (1912), who merely recorded that in guinea-pig serum they were able to keep trypanosomes alive for at least 5 hours; the important question whether the number of parasites decreased substantially during this period, or whether the parasites were present in the same number at the end of the period as at the beginning is ignored.

" 4. Our own experimental work showed that it is possible to maintain a trypanosome suspension alive *in vitro* at 37° C., without any appreciable diminution in the number of individuals, during at least the first 24 hours.

" 5. The method of preparing such suspensions and of observing changes in the number of parasites occurring in them, from time to time, is described.

" 6. It is shown that serum—fresh, or deactivated at 56° C. for half an hour—from the rabbit, ox, sheep, horse or pig, are about equally efficacious as supporting media, and that physiological saline, Ringer's solution—with or without the addition of glucose—nutrient broth and broth containing 0.2 per cent. glucose are comparatively useless.

" 7. Normal human serum, even in high dilutions, was found rapidly to destroy *T. rhodesiense* and *T. equiperdum* at 37° C. *in vitro*: it had, however, no trypanocidal action on *T. gambiense*.

" 8. It was further shown that the concentration of trypanosomes in the medium is a matter of vital importance. The parasites live longest provided their concentration does not exceed about 1,000 per cmm.; if they are present in concentrations grossly exceeding this number, they die rapidly. The explanation of this fact is, doubtless, bound up with the great metabolic activity of the trypanosomes which, when the parasites are present in considerable concentration, rapidly deprives the medium of its nutrient properties and particularly of its glucose.

" 9. The presence of glucose is essential for the life of trypanosomes *in vitro*. Information is supplied concerning the relatively enormous quantity of glucose consumed by these parasites. It was found that 0.25 cc. of heavily-infected mouse blood, containing approximately 400 million parasites, sufficed, when suspended in 5 cc. of sheep serum, to which glucose had been added, to cause within 1 hour the disappearance of between 2 mgm. and 2.5 mgm. of sugar, and within 5 hours of between 12 mgm. and 12.5 mgm."

B. Blacklock.

ROSENTHAL (F.). Weitere Untersuchungen ueber den trypanoziden Heilmeehanismus des menschlichen Serums. VI. Mitteilung. Verteilung, Umwandlung und Untergang der trypanozidogenen Substanzen des menschlichen Serums im Tierkörper. [Further Investigations on the Trypanocidal Curative Mechanism of Human Serum. VI. Distribution, Transformation and Destruction of the Trypanocidogenous Substances of Human Serum in the Animal Body.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Aug. 1. Vol. 62. No. 5/6. pp. 464-492. [36 refs.] [Med. Clinic, Univ., Breslau.]

After referring to the numerous papers which indicate that the trypanocidal power of human serum is in some manner associated with

a function of the liver, Rosenthal points out that the question of the mechanism of the curative action of human serum in experimental trypanosome infections is still little understood. Since human serum has no lethal or harmful effect on trypanosomes in the test tube some biological mechanism must occur in the body of the treated animal whereby the substances present in human serum are converted into the lethal substances. In fact, we have here a parallel to the indirect action of certain chemotherapeutic substances, e.g., the pentavalent arsenicals which likewise are inactive *in vitro*, and only disclose their curative properties in the animal body. In previous papers [this *Bulletin*, Vol. 19, p. 154 and p. 520, Vol. 20, p. 337 and p. 700, Vol. 22, p. 143 and p. 537] the author and his collaborators have shown that the reticulo-endothelial system of the injected animal plays an essential part in the curative mechanism of human serum.

The present work was undertaken with the object of ascertaining what changes took place in human serum in the animal body. He set himself the task of following the destiny of human serum in its course through the animal body, for which purpose the demonstration of trypanocidal substances in obtained animal material served as a biologically distinctive sign.

The following are the conclusions :—

1. The trypanocidal action of human serum is apparent only after injection into animals.

2. Analysis shows that in the animal body a conversion of the preformed inactive substance in the human serum into the real curative body is necessary ; this is first produced as an intravital conversion product from the human serum circulating in the animal body. The initial substance and the conversion product are designated respectively as trypanocidogenous and trypanocidal bodies. The proof of the trypanocidogenous initial substance in the animal depends on the same properties which are characteristic of human serum, viz., complete inactivity *in vitro*, failure to combine with the parasites in the test tube, and pronounced trypanocidal power when introduced into the animal. For proof of the intravitaly formed trypanocidal substance its combination with trypanosomes in the test tube is required.

3. After injection of human serum the blood of the treated animal acquires pronounced curative properties which, fundamentally, is dependent on the conversion in the circulation of the preformed initial substance of human serum. It can accumulate here in concentration which considerably exceeds the concentration existing in human serum. This indicates that, on the introduction of the human serum into the treated animal, there occurs an intravital isolation of the active principle.

4. The plasma alone is to be considered as bearer of the therapeutic products of the blood of animals treated with human serum.

5. Spread of the trypanocidal substances into the organs is not found to any appreciable extent. Likewise cell suspensions from organs are free from trypanocidal substance, so that absorptive binding does not occur.

6. Excretion of the trypanocidogenous serum substances in the urine does not occur. The disappearance of these substances must result from their being worked up further in the metabolism of the animal organism.

7. According to their biological behaviour in the animal body the trypanocidogenous substances of human serum are characterized as follows : by their relatively slow transformation in the organism, by their long sojourn and their pronounced accumulation in the blood stream, by their slight escape into the tissues and by their failure to be excreted in the urine. Their distribution and their destiny in the organism obey other laws than do, for example, bacterial toxins (Bieling and Gottschalk).

8. The intravitaly formed trypanocidal transformation products of human serum evade recognition as a rule in the conditions of *in vitro* experiments. Their presence can, however, sometimes be disclosed by binding experiments. The trypanocidal substances must exhibit intermediate products which on their formation are taken up by the trypanosomes, the intermediate steps being passed very quickly. The reticulo-endothelial cell system takes a part in the curative mechanism of human serum.

9. Through inquiry of the amount and consumption of the trypanocidogenous substances a balance of the trypanocidal curative mechanism of human serum can be made.

W. Y.

ROSENTHAL (F). Ueber Störungen der trypanociden Serumstruktur bei der perniziösen Anämie. [**Fluctuations of the Trypanocidal Substance in Serum in Pernicious Anaemia.**—*Klin. Woch.* 1929. July 30. Vol. 8. No. 31. pp. 1436-1437. [16 refs.] [Med. Clinic, Univ., Breslau.]

After discussing previous literature relating to this and allied subjects, the author passes to a consideration of his own observations on the trypanocidal power of the serum of ten cases of pernicious anaemia. The serum was obtained at various stages of the disease. In order to determine quantitatively the trypanocidal titre, the author had recourse to his previous technique, viz., the simultaneous intraperitoneal infection and subcutaneous injection of decreasing amounts of serum in 20 gm. mice.

The results obtained with the serum of the ten cases of pernicious anaemia are given in a table from which it is seen that in three cases there was no decrease in the trypanocidal titre, that in three cases there was definite decrease, and that in four cases there was pronounced decrease. There was apparently no correlation between the degree of anaemia and the trypanocidal titre. In those cases in which there was pronounced decrease of trypanocidal titre and in which a complete remission occurred there was a recovery of the trypanocidal titre to normal.

W. Y.

KLIGLER (I. J.). **Susceptibility and Resistance to Trypanosome Infection. VI. The Course of the Infection in Splenectomized Rats.**—*Ann. Trop. Med. & Parasit.* 1929. Nov. 8. Vol. 23. No. 3. pp. 315-324. With 2 charts. [7 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

In a preceding paper [this *Bulletin*, Vol. 26, p. 715] it was pointed out that the rat offered a type of resistance similar in kind but different in degree from that observed in a guineapig. It was considered that this resistance was probably referable to the reticulo-endothelial system, and consequently it seemed to be of interest to observe the course of infection in splenectomized rats. The fact that splenectomized rats developed an acute Bartonella infection, and succumbed in five or six days before the trypanosome infection had run its course, presented a serious difficulty. This difficulty was eventually eliminated by administering salvarsan prior to the removal of the spleen. As shown by MEYER, this procedure prevented the appearance of Bartonella for some time.

The following are the author's conclusions :—

" 1. Salvarsan increases the resistance of normal rats to a trypanosome infection and appears to exert a protective effect on the red blood cells. The former effect is either absent or greatly reduced in splenectomized rats.

" 2. Splenectomized rats treated with neosalvarsan to prevent a *Bartonella* infection show a complete absence of resistance to a trypanosome infection when the inoculation is given intraperitoneally. The course of infection in such rats follows a simple curve of geometric progression.

" 3. No corresponding reduction in resistance is noted in such rats when the inoculation is given subcutaneously. This is apparently attributable to the action of the salvarsan.

" 4. In normal rats the course of the infection is more rapid if the inoculum is given subcutaneously than it is when given intraperitoneally."

W. Y.

KLIGLER (I. J.), GEIGER (A.) & COMAROFF (R.). **Susceptibility and Resistance to Trypanosome Infections. VII. Cause of Injury and Death in Trypanosome Infected Rats.**—*Ann. Trop. Med. & Parasit.* 1929. Nov. 8. Vol. 23. No. 3. pp. 325-335. [14 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

The cause of death in experimental trypanosome infections has been the subject of considerable discussion. Two opposing views have been evolved to explain the cause of death in rats. SCHILLING and others assume that death is due to a toxic substance liberated by the disintegration of the parasites, whilst, on the other hand, SCHERN and his supporters believe that the cause of death is to be found in the exhaustion of the blood sugar and glycogen reserve. The authors believe that neither view is supported by experimental facts. One aspect of the problem seems to have escaped the notice of previous workers. Although there is general agreement that the blood sugar concentration is depressed, no attention has been given to the possible harmful effect of intermediate products of sugar metabolism.

With a view to investigating this question, the authors decided to determine the lactic acid concentration and alkali reserve in the blood at various stages of the infection. They reached the following conclusions:—

" 1. Injection of large doses of trypanosomes, or serum taken when the trypanosome number is at its maximum, does not produce any visible toxic symptoms in rats.

" 2. Daily injection of glucose to supplement the food affects the course of infection favourably only if started at the time of inoculation and not if started after the incubation period.

" 3. The oxygen consumption of trypanosome infected rats is not increased; towards the end of the infection it appears somewhat lower than normal.

" 4. Parallel with the increase in the number of trypanosomes, there is a progressive increase in the concentration of lactic acid in the blood—in the later stages up to three or four times the normal.

" 5. It is suggested that the pathological processes are engendered by the metabolism of the trypanosomes which results in the rapid production of lactic acid, leading to exhaustion of the alkali reserve and probably also to a depression of the oxidative processes by the specific effect of lactic acid on the haemoglobin.

" 6. Experiments are under way which indicate that injection of bicarbonate tends to increase the life of the animals as compared with the untreated controls."

W. Y.

SCHEFF (Georg). Ueber den intermediären Stoffwechsel der mit Trypanosomen infizierten Ratten. [**The Intermediate Metabolism of Rats infected with Trypanosomes.**]—*Biochem. Ztschr.* 1928. Sept. Vol. 200. pp. 309–330. With 2 text figs. [Refs. in footnotes.] [Hyg. Inst., Elisabeth Univ., Pécs.]

In this paper, which is of a biochemical nature, the author has investigated the changes in the carbohydrate, protein, and fat metabolism in rats experimentally infected with trypanosomes. Observations are also made on the changes in the red cell count, on the oxygen waste, and on the acid-base equilibrium.

Considerations of the results obtained indicate that the trypanosomes, as blood parasites, primarily deprive the organism of carbohydrates and of oxygen, and eventually also of other substances. So long as the fresh supply of the former is effective and can meet the demand there is no noticeable disturbance. So soon, however, as the liver suffers a secondary damage from functional over-work a state of hypoglycaemia arises. The simultaneous, although less pronounced, disturbance of protein metabolism is likewise the result of a direct action by the trypanosomes and of a secondary loss of function of the liver.

With the increase of trypanosomes in the blood the destruction of red cells becomes ever greater. The consumption of oxygen by the trypanosomes and the anaemia is restored so far as the oxygen supply permits. There develops, however, towards the end of the infection a hitherto undescribed form of internal asphyxia, which is very ominous for the liver of the rat. The disturbance of metabolism and the asphyxia are followed by acidosis, which, as is known, contributes to the decline of the reaction capacity of the host.

Irreversible changes in the regulation system of the animal gradually occur; these lead to the death of the rat. The fact that the morphological picture bears no relationship to the severity of the process does not invalidate this statement, because the changes occur with such great rapidity. There is no doubt that the intensity of the disturbance is directly proportional to the number of trypanosomes: and it is probable that a certain number of trypanosomes is necessary to produce the changes observed in the animal host. This interpretation is naturally only correct if the toxic action is left out of account, a procedure for which we have every ground.

Whether in chronic infections of other animals (e.g., guineapigs) with periodic appearance and disappearance of parasites similar processes occur is a matter which requires investigation. The part played by the internal secretion glands and by the reticulo-endothelial cells must also be taken into consideration.

W. Y.

ZOTTA (G.) & RADACOVICI (E.). Contribution à l'étude du métabolisme du glucose sanguin dans la trypanosomiase expérimentale. [**Metabolism of Blood Glucose in Experimental Trypanosomiasis.**]—*Arch. Roumaines Path. Expér. et Microbiol.* Paris. 1929. Mar. Vol. 2. No. 1. pp. 55–80. With 7 charts. [26 refs.] [Serolog. Inst., Bucharest.]

— & —. Sur les variations de la glycémie dans la trypanosomiase. — *C.R. Soc. Biol.* 1929. Oct. 18. Vol. 102. No. 26. pp. 129–130. [2 refs.]

The authors briefly review the work of SCHERN and others on this subject. In their own experiments they used guineapigs infected with *T. brucei* (strain Mesnil).

For the sugar estimations they employed the method of Bang, since this requires only small quantities of blood and thus allows of daily examinations. The examinations were always made between 4 and 5 p.m., i.e., eight hours after the last meal. The diet was normal.

The following are the conclusions :—

1. In guineapigs infected with nagana a progressive hypoglycaemia, proportional to the increasing number of trypanosomes in the blood, was not observed.

2. The variations of the degree of glycaemia were irregular, sometimes above and sometimes below the normal, suggestive of a disorder of the sugar-regulating centre, but in no case of a direct utilization of the blood glucose by the trypanosomes.

3. On the contrary, the constant phenomenon in the evolution of trypanosomiasis is a pre-mortal hypoglycaemia.

4. This appears quite suddenly without any previous progressive diminution in the blood sugar; in fact, it is more often preceded by a phase of hyperglycaemia.

5. The terminal hypoglycaemia is perhaps due to a nervous mechanism set in motion by the direct action of the trypanotoxin on the sugar-regulation centre or by an indirect action through the suprarenal capsules.

6. Moreover, terminal hypoglycaemia is not specific for trypanosomiasis. It is a biological state characterizing the premortal period of a large number of diseases.

W. Y.

ANGLOTTI (Enrique) & CARDA (Pedro). La glucemia en la tripanosomiasis experimental del cobaya. Nota preliminar. [**Glycaemia in Experimental Trypanosomiasis of the Guineapig.**]*—Medicina Paises Cálidos.* Madrid. 1929. Sept. Vol. 2. No.5. pp. 431-435. With 1 text fig. [9 refs.] French summary p. 435. [Parasit. Lab., Faculty of Med., & Red Cross Dispensary, Madrid.]

Using the method of Hagedorn-Jensen, the authors determined the degree of glycaemia in the blood of guineapigs infected with *T. brucei*. They found an increase of the blood sugar proportional to the intensity of the infection: in two cases the glycaemia increased progressively, and only decreased shortly before death.

W. Y.

LOCATELLI (Piera). Les mégacaryocytes des cobayes trypanosomés. [**The Megacaryocytes of Trypanosome-Infected Guineapigs.**]*—C. R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25. pp. 1048-1050.

The author discusses the changes in the system of megacaryocytes found in guineapigs which have died from an infection with *T. equiperdum* or *T. brucei*. The nucleus particularly is profoundly changed; the cytoplasm may be either basophil or oxyphil. Those showing nuclear changes have almost always a basophil cytoplasm; the degeneration of the nucleus precedes the degeneration of the cytoplasm (vacuolation, etc.). The reaction is the more intense the longer the period the animal has survived: in animals which lived for 3 to 4 months after inoculation one finds nuclei in all stages of pycnosis. On the contrary, if the animals died shortly after infection the most striking feature is the remarkable frequency of nuclear mitosis. The fact that in the animals which exhibit considerable nuclear mitosis one also encounters cells with pycnotic nuclei and also quite young forms, megacaryoblasts in all stages of differentiation, leads one to suppose that the pathogenic stimulus which causes degeneration of

the adult megacaryocytes accelerates the development of the young forms. In infections of longer standing the young forms are more rare, owing to the depletion of the reserves of the organism.

W. Y.

LEVINSON (L. B.). Der Einfluss von Alkohol auf die Infektion mit *Trypanosoma gambiense* bei weissen Mäusen. [**The Influence of Alcohol on *T. gambiense* Infection in White Mice.**—*Zent. f. Bakt.* I. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 488–492. With 4 graphs in text. [1 ref.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

Mice infected with the author's strain of *T. gambiense* ran a course lasting about 3 weeks. In order to control exactly the amount of alcohol administered, it was given *per os* by the method described by ROSENHOLZ (1926). Each mouse was given 0.3 cc. of 15 per cent. alcohol, which is approximately 2.2 cc. of absolute alcohol per kilo. of body weight, assuming the average weight of the mouse to be 20 gm. This dose was well tolerated, only an insignificant proportion of the animals dying, and then only when the alcohol had been given for many days. Some mice were limp after the dose and lay motionless for many hours, but recovered completely.

The results of the experiments, which are set forth in charts and tables, showed that the administration of this dose of alcohol, beginning the day before infection and either daily or every other day throughout the disease, exerted no influence upon the course of the infection. The daily administration of the alcohol 7 to 14 days before infection and afterwards until the time of death hastened the end quite perceptibly. In mice which had been poisoned for a sufficiently long time the infection ran a more severe course than in the control animals.

W. Y.

v. RAZGHA (Andreas). Ueber die Zuchtung der menschenpathogenen Trypanosomen. [**On the Cultivation of Trypanosomes Pathogenic to Man.**—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 55–66. With 1 text fig. [15 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

A brief summary of the efforts of previous workers in this direction is given. In his first experiments Razgha employed Ponselle's (1924) hypotonic medium. This consists of equal parts of rabbit serum (for subcultures defibrinated rabbit blood) and of the following solution: Varying amounts of NaCl, from .3 to .8 gm., according to the trypanosome species, to 100 cc. of double distilled water: to this is added Witte's peptone 2 gm. and gelatine 2 gm. and finally 1 cc. of normal Na_2CO_3 solution. According to PONSSELLE this medium has two peculiar properties, firstly, its hypotonic character, and secondly, its capacity, through adsorption, of rendering inactive the antiparasitic immune body of the inoculated infected blood. It is recommended that only pure gelatin—Coignet or Medaille d'Or—should be used, and that it should be thoroughly washed daily for six days in distilled water, and finally hardened in 95 per cent. alcohol. The gelatin and peptone should be dissolved at 100° C.; the medium is sterilized in the autoclave at 110° C. and can be kept at room temperature for several days. The peculiar physico-chemical character of this medium is shown by the fact that when blood is added the corpuscles sink to the bottom with remarkable speed.

As the patient himself had very few parasites (*T. gambiense*) in the blood, a monkey, *Macacus rhesus*, was inoculated; and as soon as its blood showed 2 or 3 trypanosomes to an oil immersion field, 1 to 3 drops were inoculated into the culture tubes containing Ponselle's medium. The tubes were left two weeks in a dark place and then examined, but no trypanosomes were found.

As the medium in these tubes was found to exhibit a fine fibrin network, and even at times a distinct blood clot, it was decided not to inoculate the citrated blood directly into the tubes, but first to dilute it with Ringer's solution and then, after centrifugation, to inoculate the clear supernatant fluid containing the trypanosomes. Notwithstanding this improved technique the cultures were still negative. To his surprise, however, the tube containing the remainder of the supernatant fluid and deposit, which had been kept with the culture tubes as a sort of control, was found to contain large numbers of parasites. This simple medium, therefore, appeared to be an excellent culture medium for *T. gambiense*.

Further work showed that the serum of only man and monkey would serve; that of other laboratory animals, e.g., rabbit, rat, and goat, failed. In his experiments the author therefore practically limited himself to human blood. His medium consisted of equal parts of sterile Ringer's solution (with .6 per cent. NaCl) and of citrate human blood. The blood was obtained from a vein of the arm into a sterile syringe containing $\frac{1}{4}$ vol. of 2 per cent. sodium citrate in .85 per cent. NaCl solution. The medium was then divided amongst tubes containing 2 to 3 cc. Inactivation is unnecessary, but it is preferable to allow the medium to stand for several days before inoculating it.

Successful cultures of the recently isolated *T. gambiense* strain were obtained in 31 of 40 attempts. In one observation living flagellates were found as long as the 44th day and in another up to the 40th day. The inoculated tubes were kept at room temperature, preferably at 22–24° C.; at higher temperatures the trypanosomes had a detrimental action on the parasites. In his work with *T. gambiense* the author did not notice any pronounced difference resulting from variations in the salt concentration, but he has the impression that .6 per cent. NaCl gives the best results.

During the first two days, the trypanosomes decrease greatly in number and many degeneration forms are seen. A certain number of individuals, however, survive and divisional forms are to be seen. The appearance of cultural forms is first manifest on the 3rd or 4th day; these exhibit much greater translatory movement than do the blood forms. In stained preparations the general size of the cultural forms is found to resemble that of the blood forms, but the posterior end is more pointed and the blepharoplast moves forwards to occupy a position intermediate between that of the nucleus and the posterior extremity; the undulating membrane is narrowed and the protoplasm contains small granules or vacuoles. During the succeeding days the blood forms become scantier and the cultural forms more numerous. Between the 3rd and 6th days rosettes can be seen for the first time.

After a time—usually at the end of the first week—almost without exception a highly refractile granule appears at the junction of the middle and posterior thirds of the trypanosome body. This, which is a striking feature in fresh preparations, but cannot be seen in Giemsa and stained preparations, is probably nothing else than the blepharoplast vacuole. The further development of the trypanosomes is always in the direction of slender forms, and at the same time the body becomes more and more stuffed with granules which stain deep blue to black. Typical crithidia have not yet been seen, but the extremely long and narrow form exhibits a striking resemblance to the forms found in the gut of *Glossina*.

Subcultures made during the period of active multiplication of the parasites are successful and behave as the parent culture. Attempts to subculture further were not successful.

During his investigations a second strain of *T. gambiense* was isolated from a patient in hospital. This allowed the author to compare the behaviour of this strain with that of the earlier strain and of certain old strains which had been long maintained in the laboratory by animal passage. For this purpose he used a strain of *T. gambiense* kept for 8 years in rats and two strains of *T. rhodesiense* kept in animals for 5 and 17 years,

respectively. Seven attempts to culture the older *T. rhodesiense* strain failed, and only the twelfth attempt was successful in the case of the other *T. rhodesiense* strain, and the fifth in the case of the old *T. gambiense* strain. On the contrary, cultures with the new *T. gambiense* strain were always successful, and the cultures lived longer than those made from the older strain.

The author believes the failure of previous attempts to culture *T. gambiense* may be partly explicable by the fact that the attempts were made with old strains. Possibly, the failure with old strains was due to the gradual development of a susceptibility to human serum, or possibly to the fact that prolonged sojourn in the vertebrate host had so changed the parasite that it was no longer capable of developing in the vertebrate host or in the culture tube.

That a susceptibility to human serum can be produced as the result of prolonged passage through laboratory animals is known from the work of MESNIL, ZEISS and others. According to MESNIL, serum loses its power to damage trypanosomes if it is kept for several days (ZEISS's observations do not support this), and consequently it is desirable to keep the medium, when it has not been deactivated, for several days before use. Whilst the susceptibility to human serum first appears after prolonged passage through animals, and even then not always, the work of DUKE has shown that animal passage for two years or even less destroys the capacity of trypanosomes to develop completely in *Glossina*. For these reasons the author favours the latter alternative as the explanation of his non-success in attempts to culture old strains.

In conclusion, the author refers to observations made regarding the capacity of his cultures to infect mice. Up to six days the results of culture inoculation did not differ appreciably from those of blood inoculation. From the seventh day onwards the cultures had apparently lost their power to infect mice. The author, however, refers to the low pathogenicity of his strains of *T. gambiense* for mice, and states that more work remains to be done on this subject.

W. Y.

- i. GALLIARD (Henri). Remarques sur la culture de *Trypanosoma cruzi* Chagas. [Notes on the Cultivation of *T. cruzi*.]—*Ann. Parasit. Humaine et Comparée*. 1929. Sept. 1. Vol. 7. No. 5. pp. 367–376. With 3 text figs. [29 refs.]
- ii. ——. Envahissement précoce et intense de la cavité abdominale chez la souris au cours des infections à *Trypanosoma cruzi*. [Early Invasion of Abdominal Cavity in Mice infected with *T. cruzi*.]—*Ibid.* pp. 377–380. [2 refs.] [Parasit. Lab., Faculty of Med., Paris.]

i. The author has been able to isolate in pure culture four different strains of *T. cruzi*, two from Brazil, one from Uruguay, and one from Paraguay. From the point of view of culture, all behaved in a similar fashion. Abundant cultures of great longevity (six months) were obtained in each case. A semi-solid medium of the type described by WENYON was used and to this was added sugar and whole ox blood. The constitution of the medium and the amount of chlorides was found to be of importance for a rapid and intense development of the parasites. The following formula was used :—

Water	...	...	...	...	...	1,000 cc.
Gelatine	...	...	...	...	...	4 gm.
Glucose	...	...	...	...	...	2 gm.
Sodium chloride	...	...	...	...	...	4 gm.

Under such conditions at ordinary temperatures the culture developed rapidly. The temperature was not found to have much action provided

it did not exceed 25° C. The evolution of the cultural forms varied according to the medium. In the semi-solid medium used by the author crithidial forms sown in the course of subculture divided actively but never became converted into leishmania or leptomonas forms and never gave rise to rosettes, such as are seen in liquid media. In recent cultures (15 days to two months) the trypanosomes exhibited a remarkably uniform morphology, but in older cultures polymorphism was the rule. When hypotonic media (medium of Ponselle) were used, the cultures developed rapidly at ordinary temperature, and in them it was possible to observe very clearly the different stages of the evolution of the metacyclic trypanosomes and of degeneration forms. It appeared that the hypotonicity rather than the temperature exhibited a favourable action on the production of trypanosome forms.

ii. In the course of experiments on the inoculation of cultures of *T. cruzi* the author observed some interesting facts bearing on the evolution of the infection in the rat and mouse. The virus used was obtained from naturally infected *Triatoma rubrovaria* captured near Montevideo. The cultures inoculated were those of the 11th passage. An endeavour was made to trace the evolution of the inoculated forms in the peritoneum, but at the end of one dozen hours nothing was found. The peritoneal cavity, however, at the end of 48 hours revealed the presence of trypanosome forms, which, although scanty at this time, rapidly increased in number. The parasites found were typical blood forms and quite different from the metacyclic trypanosomes of the culture.

In order to investigate the matter further, rats and mice were inoculated with a culture under the skin of the back, and at the end of 48 hours the author was able to discover the commencement of a peritoneal infection which developed in an entirely similar manner. Consequently, the site of inoculation had nothing to do with the localization of the infection, which is apparently due to a tropism.

The evolution of the infection is variable. In the rat it is not very marked and disappears after some days. In the mouse the infection persists throughout the disease. The evolution is progressive, and after some days may reach an extraordinary intensity, even before the parasites have appeared in the peripheral blood, and in such cases death may supervene without apparent infection. Numerous developmental forms are found in the abdominal muscles (leishmania) and in the serous cavities (leishmania and leptomonas).

W. Y.

i. TORRES (C. Magarinos) & DE AZEVEDO (A. Penna). Cellules géantes kystiques chez l'armadille (*Dasybus novemcinctus* L.), qui présente l'infection spontanée par le *Trypanosoma cruzi* Chagas, 1909. [*Cystic Giant Cells in the Armadillo presenting Spontaneous Infection by T. cruzi.*—*C.R. Soc. Biol.* 1929. Nov. 4. Vol. 102. No. 28. pp. 412-414. With 2 text figs. [1 ref.]

ii. — & —. Cellules géantes kystiques chez le chien infecté expérimentalement par *Trypanosoma cruzi*, souche de l'armadille. —*Ibid.* pp. 416-418. With 2 text figs. [Oswaldo Cruz Inst., Rio de Janeiro.]

i. Whilst examining the tissues of an armadillo captured in the state of Minas Geraes, Brazil, which at the time it was killed

contained numerous *T. cruzi* in the peripheral blood, the authors found scanty Leishmania forms in the myocardium. A most interesting discovery, however, was the presence of large agglomerations of *T. cruzi*, not in the muscle fibres, but in the cytoplasm of giant cells. The infected cells were covered with a very distinct membrane constituting a true cyst wall of double contour; within the double wall is a clear space apparently without structure. The cells were of large size varying from $20 \times 15 \mu$ to $40 \times 30 \mu$. In the authors' opinion what CROWELL (1928) describes as "the presence of a parasitic thrombus in a small artery in the myocardium" is probably a gigantic cyst comparable to that found by them.

ii. In the second note the authors state that they have found similar cysts in the heart, thyroid and kidneys of dogs experimentally infected with *T. cruzi* from the armadillo. Further details regarding the structure of the cyst are given.

W. Y.

CAMPOS (Ernesto de Souza). Trypanosomiasis americana congenita experimental. [**Congenital American Trypanosomiasis Experimentally Transmitted.**]—*Bol. Biol.* S. Paulo. 1929. June 30. No. 15. pp. 28-33. With 6 figs. [3 refs.] [Microbiol. Lab., Faculty of Med., S. Paulo.]

A bitch was infected at the age of 9 months with *T. cruzi*; after a time the parasites were no longer found in the peripheral blood, but at two subsequent pregnancies, one six months and the other nineteen months later, the infection was found to have been transmitted to the puppies. Some of these were killed and the pathological histology characteristic of the disease was confirmed in the various tissues. Moreover, the blood from one of these reproduced the disease when inoculated into a healthy animal.

H. Harold Scott.

ADANT (Max). Contribution à l'étude de l'immunité dans les infections à trypanosomes. [**Study of Immunity in Trypanosome Infections.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. June 30. Vol. 9. No. 2. pp. 159-178. [24 refs.] [Bact. Inst., Louvain.]

After a brief review of the work of others on the subject of immunity in trypanosome infections, the author passes to his own investigations which relate especially to cross immunization and the Rieckenberg test. He used a strain of *T. pecaudi* which, as the result of numerous passages through mice, had acquired a considerable degree of virulence, killing the mice in 4 to 6 days.

The following are the conclusions :—

1. The immunity which results from the treatment of animals infected with the normal strain of trypanosomes is active only against this strain and not against the serum-resistant variety of it. Nevertheless, when the latter is transferred to a new animal, it loses its resistance to the immune substance and behaves in the cross immunity test differently to the normal strain. In fact, if it is true that animals immune to the normal strain are resistant to this strain and the resistant strain passed through a new

animal, normal animals cured of an infection of the resistant strain are only immune to this resistant strain previously passed through a new animal and not against the normal strain. In other words, the strain *pecaudi* rendered resistant to serum conserves its properties entirely only in so far as it is maintained in contact with the antibody which has caused its transformation.

Observations with the cross immunity experiments and with those of the Rieckenberg test performed with the strain resistant to serum which has been passed five times through new animals have given the same results as those obtained after a single passage of the serum-fast strain through a new animal.

These results differ from those obtained by EHRLICH and his school, and must, failing proof to the contrary, be attributed to the different species of trypanosome used.

2. *T. pecaudi* passed through another species of animal does not undergo any transformation appreciable by the cross immunity or Rieckenberg tests. KROB's results, which differ from these, are also to be explained on the ground that he used a different species of trypanosome (*T. brucei*).

3. Comparative study of immunity *in vivo* and of Rieckenberg's test shows that the two may exhibit a certain discordance. It was found that trypanosomes resistant to serum passed through a new animal no longer infect animals resistant to the normal strain, and yet these trypanosomes behave differently in Rieckenberg's test from those of the normal strain.

4. In the phenomenon of attachment it is not only the platelets of the immune animal which produce the reaction; when the test is performed with immune serum and citrated trypanosome blood, the test is equally positive.

5. Thrombocytobarins are formed in the course of an infection with *T. pecaudi*; it was observed that the serum of animals in the last stage of infection causes attachment of the platelets to the trypanosomes obtained from the animal at the beginning of its infection.

It is not possible to explain with certainty the reason of this paradoxical phenomenon, particularly the absence of attachment of the platelets to the trypanosomes during infection, since these trypanosomes behave in cross immunity tests exactly as do those of the original strain.

W. Y.

JAMOT (E.). La maladie du sommeil au Cameroun. [**Sleeping Sickness in Cameroon.**]—*Rev. Prat. Malad. des Pays Chauds.* 1929. July. Year 8. Vol. 9. No. 7. pp. 326, 329-332, 335-337.

In this article, which is of a general nature, the author gives a brief account of the history and present position of sleeping sickness in the Cameroons. No special reference is necessary.

W. Y.

i. STEUDEL. Die Schlafkrankheit und der Volkerbund. [**Sleeping Sickness and the League of Nations.**]—Reprinted from *Koloniale Rundschau.* 1929. No. 5. 7 pp.

ii. —. Die Schlafkrankheit in Deutsch-Ostafrika vom Beginn bis zur Gegenwart. [**Sleeping Sickness in German East Africa from the Beginning until the Present.**]—Reprinted from *Mitt. a.d. Deut. Schutzgebieten.* 1928/9. Vol. 36. No. 2. pp. 61-79. With 1 map in text.

- iii. —. Epidemiologische Betrachtungen ueber die Wege der Schlafkrankheit und ihre Ausbreitung durch den Weltkrieg. [**Epidemiological Observations on Sleeping Sickness and its Spread through the World War.**]—Reprinted from *Africa. Jl. Internat. Inst. of African Languages & Cultures*. 1929. Apr. Vol. 2. No. 2. pp. 105–128. English summary pp. 128–129.

These three articles are of a general nature and contain nothing new. They require no special reference.

W. Y.

- CARPENTER (G. D. H.). Sleeping Sickness. A Lecture delivered to the Uganda Branch of the British Medical Association on 7th June, 1929.—*Kenya & East African Med. Jl.* 1929. Aug. Vol. 6. No. 5. pp. 131–148.
- ZAVATTARI (Edoardo). I tripanosomi africani parassiti dell'uomo. Nuovi fatti e nuove ipotesi sulla loro individualità.—Reprinted from *Riv. Sci. Naturali "Natura."* 1929. Vol. 20. pp. 73–91. With 6 figs. [3 refs.] [Inst. of Comparative Anat. & Physiol., Univ., Pavia.]

RABIES: A REVIEW OF RECENT ARTICLES. XII.*

i. *Virus.*

PIRANI¹ describes cases of rabies in Eritrea, in man, donkey, dog, cat, etc. In most cases Negri bodies were not found in the brain, but experimental transmission was invariably successful. The clinical manifestations varied with the species of the animal, and with the number and position of the bites.

LEVADITI, LÉPINE and SCHOEN² have continued their researches on the mutation of rabies virus. During the course of subpassage of a strain of street virus through two different series of animals they observed striking differences of character. The first series behaved in the usual manner and was progressively mutable into fixed virus, with decrease in the number of Negri bodies. In the second series the incubation periods were shorter (4, 5, 6 and rarely 7 days during 34 passages) and in none of the passages were Negri bodies observed. However, in the interior of the nuclei of certain neurones certain round, irregular or oval hyperchromatic basophile bodies of a hyaline appearance were found. These appear to result from the fragmentary degeneration of the nuclear chromatin, and from aggregation of the fragments. They are found chiefly in the horn of Ammon, and the authors suggest that they be called "intranuclear rabies bodies." This strain is considered to be a peculiar variety of fixed virus.

NICOLAU and KOPCIOWSKA³ have studied a virus DK submitted to them as a herpetic virus. It killed rabbits in 12 days when inoculated into the cornea. It seldom affected rabbits when rubbed into scarified skin. It killed in 4 to 7 days, with symptoms of paralysis when introduced intracerebrally. It had in general the characteristics of a fixed rabies virus. From a series of cross immunity experiments they conclude that the virus DK is a true rabies virus.

REMLINGER and BAILLY⁴ contrast the viruses of rabies and herpes. The latter virus when inoculated into the brain remains localized at the site of inoculation as can be shown by animal experiment. The virus of rabies on the other hand disappears after some hours from the tissue at the point of inoculation. For several days it is absent, and then shortly before the first symptoms of the disease appears in control

* For the eleventh of this series see Vol. 26, pp. 725-739.

¹PIRANI (Armando). Sulla lotta antirabbica in Colonia Eritrea.—*Arch. Ital. Sci. Med. Colon.* 1929. June 1. Vol. 10. No. 6. pp. 242-247. English summary p. 247. [Sero-Vaccine Inst. of Eritrea, Asmara.]

²LEVADITI (C.), LÉPINE (P.) & SCHOEN (R.). Mutation brusque du virus rabique des rues en une variété particulière de virus fixe.—*C.R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25. pp. 1050-1057. With 4 text figs. & 2 graphs. [1 ref.]

³NICOLAU (S.) & KOPCIOWSKA (L.). Identification d'un virus prétendu herpétique, en réalité rabique, par des expériences d'immunité croisée avec la rage. Immunisation anti-rabique cutanée, à l'aide d'injections intradermiques répétées de virus formolé.—*C.R. Soc. Biol.* 1929. June 28. Vol. 101. No. 22. pp. 655-657. [5 refs.]

⁴REMLINGER (P.) & BAILLY (J.). Sur une différence de comportement des virus rabique et herpétique dans l'encéphale du lapin.—*C.R. Soc. Biol.* 1929. July 5. Vol. 101. No. 23. pp. 773-775. [1 ref.] [Pasteur Inst., Morocco.]

animals, it reappears again. This suggests to the authors that the parasite of rabies has a cyclic development, whereas the agent of herpes has no cycle of evolution. The observation is considered to be in favour of the microsporidial character of the rabies parasite.

In a second communication REMLINGER and BAILLY⁵ state that the rabies virus persists in the brain of the toad for not more than 3 days, in the frog for not more than 6 days, but in the tortoise for at least 54 days. Two explanations are suggested. The first that the duration of persistence is proportional to the volume of emulsion which can be inoculated (toad 0.2 cc., frog 0.3 cc., tortoise 0.5 cc.). The second is that if the virus of rabies is a microsporidium with a cyclic evolution, the virus may be able to carry out its cycle in receptive animals (rabbit) but not in refractory animals (tortoise).

In a third paper⁶ these authors collect the evidence in favour of a cycle of evolution of the parasite. From experiments on the dog and the rabbit, which are receptive animals, it appears that the virus remains in situ at the point of inoculation and then disappears. This is called the *phenomenon of eclipse*. From experiments on refractory animals (tortoises) it appears that the virus can be recovered up to 110 days at the site of inoculation. This is called the *phenomenon of permanence*. In receptive animals they consider that the virus may have undergone cyclic evolution, whereas in the latter the cycle is interrupted.

TZEKHOVITZER and GOLDENBERG⁷ describe a curious property of the rabies virus. They find that whilst the serum of normal rabbits acts only feebly on atropine (0.4 cc. serum neutralizes 0.1 cc. of atropine 1/5000), the serum of the same rabbit 4 days after infection with fixed virus, neutralizes the same quantity of atropine in a dose of 0.0025 cc.

When the serum of the normal rabbit is more active (0.25 cc. neutralizes 0.1 cc. of atropine 1/500), the effect of inoculation with fixed virus is to neutralize the same quantity of atropine in a dose of 0.0006 cc. Thus the neutralizing power of the serum is augmented in both cases, in the first 160 to 320 times, in the second from 40 to 80 times. This action may be associated with the hyperactivity of the thyroid gland, of the hypophysis, and of the pineal gland induced during the course of rabies.

ii. Symptoms.

THIÉRY⁸ draws attention to a case of a woman who died after having presented symptoms of rabies, and in whose brain Negri bodies were demonstrated. She had only been bitten on one occasion, and the dog in question, as to whose identity there was no doubt, survived without showing any symptoms of the disease. He examines the various hypotheses (1) that the dog was a carrier of the virus in a latent state, (2) that the woman had been previously bitten by another animal,

⁵REMLINGER (P.) & BAILLY (J.). Sur le comportement du virus rabique dans l'encéphale de la tortue.—*C.R. Soc. Biol.* 1929. July 17. Vol. 101. No. 24. pp. 860-863. [Pasteur Inst. of Morocco, Tangiers.]

⁶REMLINGER (P.) & BAILLY (J.). L'évolution du parasite de la rage comporte-t-elle un cycle?—*Ann. Inst. Pasteur.* 1929. Nov. Vol. 43. No. 11. pp. 1396-1407. [3 refs.]

⁷TZEKHOVITZER (M.) & GOLDENBERG (J.). Propriété nouvelle du sérum des lapins infectés par le virus fixe.—*C.R. Soc. Biol.* 1929. Nov. 22. Vol. 102. No. 31. pp. 577-578.

⁸THIÉRY (J.). Un chien d'apparence saine peut-il transmettre la rage?—*Rev. Gén. de Méd. Vét.* 1929. Aug. 15. Vol. 38. No. 452. pp. 451-460. [47 refs.]

(3) that the dog suffered from a mild type of infection followed by cure, and (4) that the dog was refractory to rabies, but had the virus in its saliva.

KNUTTI⁹ describes a case of paralytic rabies, in which the course was that of an ascending paralysis of the Landry type. Negri bodies were found in the brain, and the animal test gave a positive result. The pathological changes found in the brain are described in detail.

iii. Pathology.

IONESCO and TEODOSIU¹⁰ have estimated the glycogen content of fresh organs in cases of street and fixed virus rabies, employing the method of Best (after Schmorl). Glycogen was found in large quantity in the medulla, in various parts of the cerebrum, and in the horn of Ammon, both in street virus dog brains, and in fixed virus rabbit brains. Glycogen appears in the form of drops measuring from 3 to 4 μ . They occur in the protoplasm of large cells, or around the nuclei of small cells, and are also seen in the polynuclears and in endothelial cells. Glycogen is also found in the secreting cells of the kidneys, and in the heart.

DWIJKOFF and BOGOSLOWSKI¹¹ summarize the results of the post-mortem examination of the brains of 42 cases of human lyssa, within the period 1921-1927, at the Metschnikoff Institute at Moscow. In 38 of these (i.e., 90.5 per cent.), Negri bodies were found. In the remaining 4 the bodies were not found, and in these cases it is stated that the incubation period was short (15-20 days). As the incubation period becomes longer so does the number of bodies increase. In cases of short incubation the bodies are small structures, and as incubation lengthens they increase in size and in complexity of structure. The authors noted, however, cases of very long incubation with few bodies, and cases of short incubation with numerous bodies.

SSAWATEJEW and SSIDOROW¹² divide Negri bodies into 5 types. The first and commonest is in the form of a rosette. A second type is ring-shaped. A third is characterised by "innen Körper." A fourth consists of elongated bodies containing small granules. A fifth type is of larger size. The staining method used is that of Carpano, after fixation by Schaudinn's method. From their observations the authors believe that the Negri body is not a cell degeneration, but a true parasite, which possibly has a cyclic evolution.

In a beautifully illustrated paper TUPA¹³ describes modifications of

⁹KNUTTI (Ralph E.). Acute Ascending Paralysis and Myelitis due to the Virus of Rabies.—*Jl. Amer. Med. Assoc.* 1929. Sept. 7. Vol. 93. No. 10. pp. 754-758. With 4 text figs. [23 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

¹⁰IONESCO (Démètre) & TEODOSIU (T.). Le glycogène dans la rage.—*C.R. Soc. Biol.* 1929. May 31. Vol. 101. No. 18. pp. 321-322.

¹¹DWIJKOFF (P. P.) & BOGOSLOWSKI (W. N.). Ueber die Negrischen Körperchen beim Menschen. Professor S. W. Korschun zum 35-jährigen Jubiläum seiner wissenschaftlich-ärztlichen Tätigkeit gewidmet.—*Zent. f. Bakt.* I. Abt. Orig. 1929. June 28. Vol. 112. No. 6/8. pp. 441-444. [4 refs.] ["Metschnikoff" Inst. for Infectious Diseases, Moscow.]

¹²SSAWATEJEW (A. I.) & SSIDOROW (N. W.). Zur Morphologie der Negrischen Körperchen.—*Zent. f. Bakt.* I. Abt. Orig. 1929. Aug. 21. Vol. 113. No. 5/6. pp. 425-428. With 65 figs. on 1 double plate. [7 refs.] [Metschnikoff Inst., & State Inst. for Exper. Vet. Med., Moscow.]

¹³TUPA (A.). Recherches cytologiques dans la rage expérimentale.—*Arch. Roumaines Path. Expér. et Microbiol.* Paris. 1929. Mar. Vol. 2. No. 1. pp. 113-128. With 36 figs. on 17 plates. [22 refs.] [Serolog. Inst., Bucharest.]

the mitochondria, and the internal apparatus of Golgi in the nerve cells of rabbits infected with fixed virus. The changes are described in detail, and can only be indicated here. The mitochondrial rods are elongated and their general arrangement is different to that found in the normal cell. The appearance suggests a dissolution of the constituents into the protoplasm rendering it more opaque. At the same time the mitochondria lose their staining properties. The terminal masses are augmented in volume to double or triple their normal size.

The internal reticular apparatus of Golgi shows similar changes, the "cordons" are unequal, irregular and vesiculated. The central parts lose their staining properties. In both instances the changes appear to be of an unknown physico-chemical nature. The apparatus of Golgi is partly hypertrophied, the mitochondrial arrangement is altered in direction and curvature, and the Nissl bodies are fragmented.

Koch¹⁴ considers with special reference to three cases of human rabies in persons who had undergone pasteurian treatment, the possibility of determining whether the fixed virus of the vaccine or the street virus of the infection was the cause of death. Following Busson he holds that there is no sharp boundary between the two types of virus. The length of the incubation period is not a criterion: it may be short in cases of street virus infection, and long where fixed virus is operating. The type of animal employed for the test, the method of application, the quantity of vaccinal material, and various physical and chemical modifications all have their influence. In the three cases of paralytic and atypical human rabies which he describes such a differentiation was impossible. The virus appeared to be unevenly distributed in the various parts of the brain, and in some parts it was entirely absent. In practice, therefore, it would be necessary to carry out animal experiments with tissue from many parts of the brain and cord. He believes that treatment should be given to persons suffering from tuberculosis of the lungs only when it is absolutely necessary, since that disease predisposes the patient to street virus infection in an abortive paralytic form.

Busson¹⁵ discusses the etiology of post-vaccinal paralysis. In a previous paper (this *Bulletin*, Vol. 26, p. 216), it will be remembered that he found fixed virus in the brains of two persons who had been inoculated with living virus but who had not come in contact with street virus. This strengthens his view that the cause of post-vaccinal paralysis is to be found in fixed virus. He believes that the essential difference between fixed virus and street virus lies in greater toxicity and greater "organo-specific fixation" with loss of general infectivity. He also holds the view that under certain conditions fixed virus can, to a certain extent, revert to the street virus type and so give rise to post-vaccinal paralysis. Amongst these conditions may be the introduction of a subsequent street virus infection or injury to the brain from other diseases such as tuberculosis.

The article is very closely reasoned and worthy of careful study.

¹⁴Koch (Jos.). Kann die Differentialdiagnose, ob der Tod eines während oder nach der Pasteurschen Schutzimpfung gestorbenen Patienten durch das Strassen- oder Passagevirus verursacht wurde, durch den Tierversuch gestellt werden? Ein Beitrag zur Klinik und Pathologie der paralytischen und atypischen *Lyssa humana*.—*Zent. f. Bakt.* I. Abt. Orig. 1929. Aug. 21. Vol. 113. No. 5/6. pp. 376-392. [30 refs.] [Robert Koch Inst., Berlin.]

¹⁵Busson (B.). Experimentelle Studien ueber das *Lyssa-Virus*.—*Zent. f. Bakt.* I. Abt. Orig. 1929. July 30. Vol. 113. No. 3/4. pp. 290-301.

CALDERINI¹⁶ surveys in detail the whole question of the nocuousness of fixed virus. He also discusses the cases of QUAST and BUSSON with reference to the presence of fixed virus in the brains of persons who have received antirabic treatment in which living fixed virus has been inoculated. He is of the opinion that as in certain cases the incubation period of street virus may be very short it is impossible to differentiate between the two varieties when both have gained access to the body.

The question whether fixed virus accumulates in the brains of individuals treated by living fixed virus, to which reference is made above and on many previous occasions, has been further studied by ISABOLINSKI and ZEITLIN.¹⁷ Fifteen rabbits received a single subcutaneous dose of fixed virus brain (about 3.5 gm.), and were killed 7 to 14 days after this treatment. Two rabbits were inoculated with the brains of each of the 15. From 7 of the 15 original rabbits infection was conveyed to the test animals. Further subpassage proved that this was a true infection. In a second experiment on 10 rabbits active immunization by the Philips method was employed. In 4 of these the presence of rabies virus was proved by inoculation into further rabbits.

The authors conclude with QUAST that there is an accumulation of virus in the brains of immunized rabbits.

MARIE and URBAIN¹⁸ find that the serum of rabbits immunized against rabies contains antibodies. The cooked antigen of KRAUS, TAKAKI and MICHALKA, in their hands appeared to possess no specific properties. On the other hand an unheated emulsion of the medulla of a rabid brain was an active specific antigen deviating 150 units, as compared with 30 units when normal or herpetic brain substance was used.

GANTT and PONOMAREW¹⁹ extend observations on the haemato-encephalic carrier previously referred to (this *Bulletin*, Vol. 24, p. 764 and Vol. 25, p. 191). Whilst the fixed virus of Leningrad does not ordinarily infect dogs even when given in large doses subcutaneously, intramuscularly or intravenously, and whilst dogs which have received similar doses of fixed virus followed by immediate extraction of 4 to 8 cc. of cerebro-spinal fluid, do not contract rabies, the authors have found that when the dose is given by the *intramuscular route*, followed by immediate removal of cerebro-spinal fluid, all the dogs so treated contracted the disease, their brains yielded fixed virus which could be subpassaged in rabbits. This result was obtained in an experiment in which 8 dogs were employed, 4 receiving subcutaneous doses, and 4 intramuscular doses into the muscles of the leg. In a confirmatory experiment, 6 dogs received doses introduced into the muscles of the

¹⁶CALDERINI (M.). Il virus rabbico contenuto nel vaccino può arrivare ai centri nervosi nei vaccinati?—*Giorn. di Batteriol. e Immunol.* 1929. Mar. Vol. 4. No. 3. pp. 216-235. [50 refs.]

¹⁷ISABOLINSKI (M. P.) & ZEITLIN (A. J.). Ueber die Speicherung des Virus fixe im Gehirn immunisierter Kaninchen.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 62. No. 3/4. pp. 233-237. [10 refs.] [State Bact Inst., Smolensk.]

¹⁸MARIE (A. C.) & URBAIN (Ach.). La réaction de fixation dans la rage.—*C.R. Soc. Biol.* 1929. June 21. Vol. 101. No. 21. pp. 561-563. [5 refs.]

¹⁹GANTT (W. Horsley) & PONOMAREW (A. W.). Ueber den Mechanismus der Verbreitung des Tollwutvirus (Virus fixe) im Organismus.—*Ztschr. f. d. Gesamte Experim. Med.* 1929. Vol. 68. pp. 582-595. [25 refs.] [State Inst. for Exper. Med., Leningrad.]

shoulder : from 3 of these cerebro-spinal fluid was withdrawn on two occasions, all contracted rabies ; from the remaining 3 from which lymph fluid had not been withdrawn 1 died from another cause and the other 2 survived. It thus appears that for a successful infection with this strain of fixed virus, the injection must be intramuscular, and cerebro-spinal fluid must be removed. The first condition depends upon the richness in nerve endings. The second indicates that the removal of cerebro-spinal fluid facilitates the penetration of the virus into the central nervous system. In a further experiment the dose of virus was administered intravenously, and in this case the withdrawal of cerebro-spinal fluid appeared to have no influence. None of the dogs—whether the cerebro-spinal fluid was withdrawn or not—contracted the disease. Thus clearly the virus is carried to the central nervous system along the nerve trunks and apparently the withdrawal of fluid facilitated its progress. The authors failed to demonstrate this effect when the dose was injected into the larger nerve trunks (sciatic and brachial). In a further experiment, however, in which the nerve trunk was cut across, and the virus was applied to the cut surface the effect was clearly demonstrated, and the authors conclude that in the first instance the virus had not reached the axis cylinders. Thus finally the transmission of the virus is by the path of the axis cylinders of the nerves, and this transmission is facilitated by circumstances which increase the lymph flow within the nerve trunks. The authors suggest that this secondary action of the lymph fluid may operate in certain treated cases, and conditions may be such that fixed virus finds its way during treatment into the central nervous system. It is possible that this phenomenon may be related to the paralytic accident.

REMLINGER and BAILLY²⁰ present two cases which support LEVADITI'S conception of the existence of "*neuro-infections mortelles auto-stérilisable*" (this *Bulletin*, Vol. 26, p. 217). The first is that of a cock infected with street virus and dying of rabies. Negri bodies were found in the brain but the animal test was negative. The second also a cock ; an experimental infection with street virus : death on the 12th day : Negri bodies in brain : animal test negative.

TAKAYA²¹ has examined the blood of persons treated by Kyoto's method with the following results : increase of transitional, large mononuclear and plasma cells : large increase of eosinophils : considerable increase of polynuclears : slight increase of lymphocytes : no change in the number of red blood cells. The most marked change is in the eosinophils.

CARVALHO,²² as the result of the examination of the blood of 100 persons, treated during 21 days with cords dried from four to one days, and examined on five occasions, finds the usual slight modifications in the percentage of the various cellular constituents ; i.e., lymphocytes

²⁰REMLINGER (P.) & BAILLY (J.). La rage et les neuro-infections mortelles auto-stérilisables.—*C.R. Soc. Biol.* 1929. Oct. 25. Vol. 102. No. 27. pp. 296-299. [3 refs.] [Pasteur Inst. of Morocco, Tangiers.]

²¹TAKAYA (Y.). L'influence de l'injection rabique sur l'état hématologique.—*Oriental Jl. Dis. Infants.* 1929. July. Vol. 6. No. 1. [In Japanese. French summary p. 17.] [Pediat. Inst., Imperial Univ., Kyoto.]

²²CARVALHO (M. Gonçalves). Labrocytose et image d'Arneth chez les individus soumis au traitement antirabique.—*Arquivos Inst. Bact. Camara Pestana.* 1928. Vol. 6. No. 1. pp. 22-41. [13 refs.] [Camara Pestana Inst., Lisbon.]

return to normal after some reduction, monocytes change in proportion to the lymphocytes, neutrophils are reduced and later increase, eosinophiles augment constantly, basophiles remain in normal proportions. The Arneth count gives no indications which would form a guide to treatment.

In the French summary of a paper in Japanese by SEKI²³ it is stated that rabbits which have received an injection of benzol sufficient to cause a leucopenia, are more susceptible to rabies than are controls: that the effect of congestion by ligature of the jugular vein does not influence susceptibility: that the effect of anaemia by ligature of the carotid arteries is likewise ineffective.

iv. *Methods of Treatment and Statistics.*

HARRIS²⁴ reviews his experience at St. Louis, United States of America, of desiccated vaccines. He found that when the vaccine is frozen at -10°C . and dried in vacuo over sulphuric acid, about 2 per cent. of infectivity was preserved for several months. Fixed virus frozen with liquid air and then dried retained 90 per cent. of infectivity, and virus frozen with CO_2 snow and then dried as above retained 50 per cent. of its original infectivity. The subsequent loss of infectivity depends upon the temperature of storage. At a temperature of -1°C . virus retains infectivity up to three years. Subsequent experiments showed that a virus which had been preserved in vacuo until it became non-infectious, still possessed immunizing properties. In practice Harris gives 5 daily doses of 25 mgm. each of an old non-infectious vaccine, and follows with 5 similar injections of a strain partially attenuated over a period of 3 months. He quotes statistics of 3,516 cases, which includes one failure and one case of temporary post-vaccinal paralysis. For the prophylactic immunization of dogs he recommends an injection of a non-infectious vaccine, followed by a second injection of an attenuated but living virus.

D'AUNOY²⁵ relates his experience at New Orleans (U.S.A.) over a period of 18 years with Harris's vaccine. The virus is frozen with CO_2 snow, and dried over sulphuric acid or phosphoric anhydride in vacuo. The vaccine is stored at -12°C . to -18°C . in sealed tubes of pyrex glass. Dosage is measured in minimal infective doses. Such a dose being "the smallest quantity of desiccated material which within 5 days after preparation, and when kept at -12°C . to -15°C . will cause paresis in a 2,400 gm. rabbit within 7 days following intracerebral injection." The first dose consists of 250 "minimal infective doses," and the quantity is doubled daily until a maximum of 2,000 has been reached. An ordinary course consists of "11 treatments of 17,750 minimal infective doses." During the last 14 years 5,125 persons have been treated in this manner. Amongst these 5 have died from rabies, and 3 cases of paralytic accident (one fatal) have been observed.

²³SEKI (Yoiti). L'infection rabique dans ses rapports avec les troubles de la circulation.—*Oriental J. Dis Infants*. 1929. May. Vol. 5. No. 3. [In Japanese. French summary p. 32.] [Inst. of Pediat., Imperial Univ., Kyoto.]

²⁴HARRIS (D. L.). Antirabic Immunization with Desiccated Vaccine.—*Amer. J. Public Health*. 1929. Sept. Vol. 19. No. 9. pp. 980-985. [3 refs.]

²⁵D'AUNOY (Rigney). Antirabic Vaccination by Means of Desiccated Virus.—*Amer. J. Public Health*. 1929. Sept. Vol. 19. No. 9. pp. 986-990. [1 ref.] [Charity Hosp., Louisiana, New Orleans, La.]

The method of treatment used at Cluj (Romania) is peculiar. According to BOTEZ and ALBON²⁶ it consists of emulsions of dried cords along with emulsions heated according to the method of Piscariu, and preserved in neutral glycerine. Cords dried for from 0-4 days, are heated at 45°, 50°, 55° and 60°. The vaccine administered consists of various mixtures of unheated and heated vaccine to which emulsion of dried cords is added. Thus:—

Vaccine 0 :	emulsion unheated	+	emulsion of cord dried	0 days.
„ 1 :	„ heated 45°+	„	„	1 day.
„ 2 :	„ „ 50°+	„	„	2 days.
„ 3 :	„ „ 55°+	„	„	3 days.
„ 4 :	„ „ 60°+	„	„	4 days.

Treatment proceeds from vaccine 4 to vaccine 0, repeated according to the gravity of the case.

Estimations of the virulence of these vaccines show that the virulence of dried cords is variable. Vaccines 1-3 were virulent, but with prolonged incubation vaccine No. 4 was avirulent.

As the results from treatment by the method of Högyes as carried out at the Institute Alphonse XIII at Madrid were not satisfactory DA SILVA²⁷ has had recourse to etherized vaccines. As the number of persons to be treated is high (sometimes more than 250 daily) the methods of Alivisatos and Hempt have been slightly modified. The brain, divided into 4 parts, is placed in ether for 90 hours, it is then removed, and the ether is allowed to evaporate off under sterile conditions. The brain substance is then titrated, and physiological salt solution gradually added until an emulsion of 1 in 20 is obtained. This is then filtered through sterile gauze. Injections are carried out at single daily sittings, the dose for adults being 5 cc., and that for children 2 to 3 cc. Thirty injections are given in severe cases; and 20 to the lightly bitten. So far only one failure has occurred amongst 1,158 persons treated.

The blood of 30 treated persons has been examined for the presence of rabicidal substances. These appear as a rule after the third injection, though in certain instances they may not appear until later. Their persistence depends upon the number of doses which have been given. These results are better than those of ALIVISATOS, who was unable to demonstrate the presence of rabicidal substances in the blood of individuals who had received less than 50 cc. during 15 days. Thus the author considers that his simpler method of preparation is more efficacious. Two cases of paralytic accident have occurred, one of which had a fatal issue. No rabicidal substances were found in the blood of 10 persons treated by the method of Högyes.

FERMI²⁸ gives the results of ten experiments in which mice or rats previously infected—one set with fixed virus, and one with street virus—were treated, some by Fermi's phenol vaccine, and others by the Phillips method.

²⁶BOTEZ (M. A.) & ALBON (T. V.). La virulence du vaccin employé à l'Institut antirabique de Cluj.—*C.R. Soc. Biol.* 1929. Oct. 18. Vol. 102. No. 28. pp. 187-188.

²⁷DA SILVA (E. Pereira). Substances rabicides dans le sang des individus traités par le virus rabique fixe étherisé.—*Archivos Inst. Bact. Camara Pestana.* 1928. Vol. 6. No. 1. pp. 42-64. [12 refs.]

²⁸FERMI (Claudio). Metodi di cura antirabbica Fermi e Phillips.—*Polislinico. Sez. Prat.* 1929. June 24. Vol. 36. No. 25. pp. 886-889. [3 refs.]

The proportions of survivors were as follows :—

	Infected with fixed virus.		Infected with street virus.	
	Treated with phenol vaccine.	Treated with glycerine vaccine.	Treated with phenol vaccine.	Treated with glycerine vaccine.
Dose : Experiment 1 ...	3 : 5	2 : 5	4 : 5	3 : 5
" 2 ...	3 : 5	2 : 5	4 : 5	2 : 5
" 3 ...	3 : 5	3 : 5	4 : 5	3 : 5
" 4 ...	—	—	4 : 5	3 : 5
" 5 ...	—	—	6 : 10	4 : 10
" 6 ...	—	—	4 : 5	3 : 5
" 7 ...	7 : 10	4 : 10	—	—
" 8 ...	—	—	8 : 10	5 : 10
" 9 ...	6 : 10	4 : 10	—	—
" 10 ...	—	—	8 : 10	6 : 10
Totals ...	22 : 35	15 : 35	42 : 55	29 : 55

from which FERMI concludes that his treatment is more efficacious than that of PHILLIPS.

[The surprising uniformity in each column is perhaps worthy of note. It is not usual in experiments of this type to attain to such a degree of precision, though of course uniform series such as these will occur occasionally from random causes. This only emphasizes the general fact that when small numbers are employed the unusual event will occasionally turn up as the result of mere chance, and that quite wrong conclusions may occasionally be drawn from comparative experiments, simply because such comparative experiments happen by mere accident to have produced a very unusual distribution. On purely statistical grounds and according to the ordinary statistical arguments if there was no advantage in Fermi's method, such totals as he obtains would be expected to occur once in 10 times in the fixed virus series, and once in 100 times in the street virus series. The first result is not significant, and the second result is significant. Clearly further experiment is necessary.]

FERMI²⁹ also quotes a series of experiments carried out in 1907 (*Zeit. für Hygiene*, 1907), showing that treatment with 15 cc. of vaccine over a period of 30 days is much more efficacious than treatment with 30 cc. over a period of 6 days ; and again that treatment with 50 cc. over 30 days is more efficacious than with 50 cc. over 6 days.

GLOSTER, BEER, NAMBIAR and SASTRY³⁰ in an endeavour to compare the relative immunizing properties of carbolized vaccine (SEMPLE) and ether vaccine (ALIVISATOS) have arrived at the following results from experiments on animals.

²⁹FERMI (Claudio). Sull'efficacia delle vaccinazioni antirabbiche intensive, abbreviate e prolungate.—*Polislinco. Sez. Prat.* 1929. Aug. 5. Vol. 36. No. 31. pp. 1103-1104. [4 refs.]

³⁰GLOSTER (T. H.), BEER (W. A.), NAMBIAR (M. Raman) & SASTRY (S. Sitarama). Experiments on Pre-Infectious Immunization against Rabies with Carbolic and Etherized Vaccines.—*Indian J. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 286-296. With 4 charts. [9 refs.] [Pasteur Inst. of Southern India, Coonoor.]

Three separate experiments were carried out, in which carbolized fixed virus was administered to guineapigs in doses proportional weight for weight to those used in the treatment of human beings, and the animals were tested by intramuscular injection of street virus given 17 to 25 days after the completion of treatment. The combined result is as follows. Of 116 untreated control animals, 92 succumbed to rabies (79·3 per cent.), whilst of 117 treated animals 36 died (30·7 per cent.)—a very significant result.

In one experiment on guineapigs etherized and carbolized vaccines were compared, the doses of the former being proportionate weight for weight to those given to human beings by ALIVISATOS, and the doses of the latter similarly proportional to those given to human beings in India. The test dose in each case was an intramuscular injection of a polyvalent street virus. The result was as follows :—

	Number of animals tested.	Deaths.	Percentage mortality.
Ether vaccine	22	0	0
Carbolized vaccine	24	7	29
Untreated	25	15	60

A modified experiment was carried out on rabbits. In this case the two vaccines were prepared from the same fixed virus brains. The doses contained the same proportion per body weight of nerve material and were given according to ALIVISATOS' scheme. The test was by inoculation of street virus on the scarified cornea. The result was as follows :—

	Number of animals tested.	Deaths.	Percentage mortality.
Ether vaccine	21	9	43
Carbolized vaccine	25	16	64
Untreated	25	25	100

It is stated by the authors that the ether vaccine used in these two experiments "was dead or highly attenuated as it failed to infect guineapigs or rabbits when injected subdurally." For details of procedure the reader is referred to the original paper. The authors conclude (1) that "carbolised vaccine in doses proportionate to those used for human beings confers considerable protection to guineapigs against subsequent infection with rabies," and (2) that "guineapigs and rabbits immunized with etherized fixed virus by Alvisatos' method show a higher degree of immunity than is obtainable by immunization with carbolized fixed virus (Semple) even when the latter is given in the same quantity for weight as the etherized fixed virus." A collateral observation of considerable practical importance may also be quoted. Of 49 guineapigs treated with carbolized *rabbit* fixed virus vaccine 20 contracted rabies (41 per cent.) whilst of 47 treated with carbolized *sheep* fixed virus vaccine 28 succumbed from rabies (60 per cent.) and of 48 untreated controls similarly tested 43 died (90 per cent.).

[It has been thought advisable on account of the importance of the issues involved to examine the significance of the death rates in the various experiments. The results may be summarized as follows: (a) The differences between treated and controls have in each case a definite significance. (b) Ether vaccines administered in doses per kilo similar to those employed by ALIVISATOS are significantly superior to carbolized vaccines administered in doses per kilo similar to those employed in India. (c) When the doses of etherized and carbolized vaccines contain the same amount of brain substance per kilo of rabbit the mortalities do not differ significantly—in fact if one assumes that the treatments have equal efficacies a result such as that obtained would be expected to occur once in every seven experiments. (d) The apparent superiority of rabbit fixed virus over sheep fixed virus is probably insignificant. Assuming that the two viruses are of equal efficacy, a similar result to that obtained would be expected to occur once in 15 times. As the criterion of significance generally adopted is “less than once in 20 times,” it would be well if this experiment were repeated. (e) Finally, it appears that the efficacy of treatment by large doses of carbolized virus occupies a position somewhere between treatment by small doses of carbolized vaccine, and treatment by large doses of etherized vaccine. It is impossible from the available data to define this position more exactly.]

The statistics of the Pasteur Institute of Paris for the year 1928 are published by VIALA.³¹ Of 671 persons treated, none developed rabies. No untoward incidents (paralytic or other) have been observed.

Statistics from the Institute of Experimental Medicine at Leningrad for the year 1928 are published by OUCHAKOV.³² Of 1,106 persons treated, 1 died (0.09 per cent.). The vaccine employed is that of Fermi. It has also been distributed to 15 subordinate dispensaries. At these 2,100 persons were treated, of whom two developed rabies (0.1 per cent.). Two cases of paralytic accident of slight severity were observed at Leningrad.

DARLING³³ states that 5,799 persons were bitten in the City of Detroit during 1928. It was possible to obtain accurate information regarding the 2,783 dogs which bit them. Of these 581 had been vaccinated, and 2,202 had not been vaccinated. Of the 581 vaccinated 3 were rabid (or 0.52 per cent.). Among the 2,202 unvaccinated 131 were rabid (or 5.94 per cent.). From this selected group the mortalities amongst the unvaccinated and vaccinated were as 11.4 to 1. The problem was approached from a somewhat different angle, and the resulting proportion of mortalities amongst the unvaccinated and vaccinated was 12.5 to 1. The two results are consistent. The method employed is not stated, but only a single injection was given.

v. Rabies in Animals.

VIANNA³⁴ describes a case of rabies in the water hog (*Hydrochoerus capybara*). This animal had been enclosed in a cage next to a mad

³¹VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1928.—*Ann. Inst. Pasteur*. 1929. May. Vol. 43. No. 5. pp. 668–672.

³²OUCHAKOV (V. G.). Service antirabique de l'Institut de Médecine Expérimentale. (Rapport annuel pour l'année 1928).—*Arch. Sci. Biol.* 1929. Vol. 29. No. 3. pp. 255–265. [In Russian. French summary p. 266.]

³³DARLING, JR. (George B.). Does Vaccination protect Dogs against Rabies?—*Amer. J. Public Health*. 1929. July. Vol. 19. No. 7. pp. 811–812.

³⁴VIANNA (Miguelote). Un cas de rage chez le cabiai (*Hydrochoerus capybara* Linn.).—*C.R. Soc. Biol.* 1929. Nov. 4. Vol. 102. No. 28. p. 420. [Bios Inst., Nictheroy, Brazil.]

dog. The two animals were separated by a grille and could not bite each other. The water hog died of paralytic rabies, Negri bodies were found in its brain, and the animal test was positive.

DE SOUZA³⁵ describes a curious epizootic in the State of Matto Grosso, Brazil, in which bovines are mainly affected. The epizootic was at first ascribed to various causes, but has now been identified as rabies both by the presence of Negri bodies and by animal experiment. The question of direct contagion from herbivore to herbivore is fully discussed in the light of previous observations but no definite conclusion has been arrived at.

REMLINGER and BAILLY³⁶ describe cases of street virus rabies in pigeons which have been infected experimentally. They deduce their results from experiments on 50 pigeons, 15 of which were successfully inoculated. The rabies was invariably of the paralytic type, the incubation period being 12-24 days.

PLANTUREUX³⁷ & ³⁸ discusses the whole question of the control of rabies, and advises preventive vaccination, destruction of stray dogs, and the segregation of bitten non-vaccinated dogs. He describes the various methods of prophylactic inoculation, and discusses the statistical results.

HULL³⁹ discusses the spread and control of rabies in the State of Illinois. During the year 1927-1928 more than 1,200 rabid dogs were encountered. The histories of 452 rabid dogs were studied. Eighteen of these had previously received prophylactic treatment. Ten of them developed rabies within one month after vaccination, and were apparently in the incubation stage of the disease when they were vaccinated. Three developed symptoms 3½ months after vaccination. He finds that the stray dog is the reservoir of infection, and advises strict control of this class of dog. The home dog should be vaccinated against the disease.

After discussing the general questions of diagnosis and prophylaxis of rabies in animals DE FREITAS⁴⁰ discusses the results of his experience in the State of Espirito Santo (Brazil). He finds that a period of negative phase lasting for from 25 to 30 days follows the prophylactic dose. Experiments to test the duration of immunity show that after 5 months the treated animal is immune to an intraocular dose of 0.2 cc. of a 10 per cent. emulsion of fixed virus. During the year 1927, 1,219 animals were vaccinated, and during the year 1928, 1,352 animals were treated. From the year 1925 when operations were commenced there has been a steady decline in the number of cases of rabies.

³⁵DE SOUZA (Moacyr Alves). A raiva em bovinos no Estado de Matto Grosso. Epizootia de Rozario Oeste.—*Rev. Zootechnia e Veterinaria*. 1929. Vol. 15. No. 2/3. pp. 65-84.

³⁶REMLINGER (P.) & BAILLY (J.). La rage expérimentale du pigeon.—*C.R. Soc. Biol*. 1929. Nov. 4. Vol. 102. No. 28. pp. 376-378. [Pasteur Inst. of Morocco, Tangiers.]

³⁷PLANTUREUX (E.). Sur la vaccination préventive des chiens et la prophylaxie de la rage.—*Rev. Vét. et Jl. de Méd. Vét.* 1929. Aug. Vol. 81. pp. 409-419. [6 refs.] [Pasteur Inst., Algiers.]

³⁸PLANTUREUX (E.). Prophylaxie de la rage et vaccination préventive des chiens.—*Rev. d'Hyg. et de Méd. Préventive*. 1929. July. Vol. 51. No. 7. pp. 483-488.

³⁹HULL (Thomas G.). The Spread and Control of Rabies.—*Jl. Amer. Vet. Med. Assoc.* 1929. June. Vol. 74. New Ser. Vol. 27. No. 7. pp. 1047-1051

⁴⁰DE FREITAS (H. Blanc). A Raiva e sua prophylaxia pela vaccinação.—*Rev. Zootechnia e Veterinaria*. 1929. Vol. 15. No. 2/3. pp. 93-99.

DOS SANTOS⁴¹ states that at Coimbre (Portugal) antirabic immunization of dogs according to the method of Umeno and Doi has been employed on more than 27,000 dogs. The effect of these operations has been to reduce the number of persons coming for treatment at the Pasteur Institutes at Lisbon and Coimbre. They have observed 7 cases of post-vaccinal paralyses (or 0.5 per 1,000) amongst the dogs so treated.

PLANTUREUX⁴² recommends his formol vaccine for the treatment of bitten dogs, as well as for prophylactic vaccination. Following the procedure described in a previous paper (this *Bulletin*, Vol. 24, p. 227) four injections of formol vaccine are given at weekly intervals. The individual doses given are 15 cc. for animals between 3 and 7 kg., 20 cc. for dogs between 7 and 20 kg., and so on up to 70 cc. for animals between 225 and 300 kg. This method has been tested on dogs and sheep with success.

A paper by HERRMANN⁴³ carries to a further stage a controversy between the author and MIESSNER and BAARS. The former stated (this *Bulletin*, Vol. 25, p. 714), that a single dose of fixed virus, as large as it was safe to administer without risk of conveying infection, failed to give adequate protection. The latter claim that single safe doses of "Lyssin" are protective to dogs (this *Bulletin*, Vol. 26, p. 225). HERRMANN from further experiments concludes that the maximum harmless dose of MIESSNER and BAARS is insufficient to protect against subdural injection of a weak strain of street virus, and abides by his decision that a single subcutaneous dose of fixed virus does not give adequate protection.

A. G. McKendrick.

⁴¹DOS SANTOS (Marques). La vaccination anti-rabique des chiens au Portugal. — *C.R. Soc. Biol.* 1929. June 7. Vol. 101. No. 19. pp. 390-391.

⁴²PLANTUREUX (E). Traitement des animaux après morsure par le vaccin antirabique formolé. — *Bull. Acad. Vét. de France.* Paris. 1929. May. Vol. 2. No. 5. pp. 156-160. [1 ref.]

⁴³HERRMANN (O.). Ueber einmalige obligatorische Schutzimpfung der Hunde gegen Tollwut. II. Mitteilung: Entgegnung auf den Aufsatz von Miessner und Baars im Zentralbl. Bakt. Abt. I. Orig. Bd. 108, H.7/8. — *Zent. f. Bakt.* I. Abt. Orig. 1929. May 28. Vol. 112. No. 3/4. pp. 312-319. [12 refs.] [State Inst. for Med. Research, Kasan.]

REVIEWS AND NOTICES.

CHANDLER (Asa C.) [M.Sc., Ph.D., Professor of Biology, Rice Institute, Houston, Texas, recently Officer-in-Charge, Hookworm Research Laboratory, School of Tropical Medicine and Hygiene, Calcutta, India]. **Hookworm Disease. Its Distribution, Biology, Epidemiology, Pathology, Diagnosis, Treatment and Control.**—pp. xii+494. With 33 text figs. & 6 maps. 1929. Macmillan & Co., Limited, St. Martin's Street, London. [21s.]

It is curious, as the author of this book points out in his preface, that there is no treatise in existence giving an adequate account of the important work done in recent years in connexion with the human hookworms. There has grown up an immense literature on the subject but, apart from some excellent résumés in the annual reports of the International Health Board, those interested—and all medical men in the tropics and sub-tropics must be interested in a parasite which is almost ubiquitous in its distribution—must refer to innumerable scattered reports and papers to acquire an adequate knowledge. The great majority of these papers has been summarized in the pages of this *Bulletin* and it is greatly to be regretted that not only does Dr. Chandler not even mention this fact in his text or in his list of references, but actually states that “only a small fraction of the work is available to the majority even of the special workers in the field.” Even although most of those interested in hookworm disease have easy access to the pages of this *Bulletin*, there is no doubt that a connected and comprehensive account of hookworms and hookworm-disease will be of immense value.

This volume collects and collates the literature dealing with the distribution, structure, life cycle and bionomics of the parasite, the epidemiology, pathology, diagnosis, treatment, prevention and control of the disease and the technical methods employed in connexion with hookworms, their eggs and their larvae. It concludes with an extensive bibliography and a useful index.

The plan of the book is excellent and practically all the modern literature is surveyed within its pages. Each chapter, however, is written as though it were a separate article, almost unconnected with previous chapters, and there is much unnecessary repetition. Thus, for example, SVENSSON's experiments with larvae of different species of hookworms are summarized in some detail on page 92 and again on page 141—the main difference between the two accounts lying in the use of the Fahrenheit scale of temperature in the first and the Centigrade in the second. This indiscriminating mixing of the two temperature scales is, indeed, an irritating feature of the whole book.

In spite of these and other evidence of somewhat hasty preparation of the subject matter, the book is a valuable contribution to the literature of tropical diseases. It contains within its covers much material available only in scattered papers in many languages or in summaries in various numbers of this *Bulletin*, material which should be available to every tropical practitioner and a careful study of which would do much to clear up the many misconceptions still held about hookworms. The author, whose own contribution to this literature is no mean one, has rendered the subject a valuable service in bringing this material together.

T. W. M. Cameron.

FAUST (Ernest Carroll) [Ph.D., Professor of Parasitology in the College of Medicine of Tulane University, New Orleans, Louisiana]. **Human Helminthology. A Manual for Clinicians, Sanitarians and Medical Zoologists.**—pp. xxii+616. With 297 engravings. 1930. London: Henry Kimpton, 263 High Holborn, W.C. [36s.]

This is the first modern full-sized text book to deal exhaustively and exclusively with human helminthology: and it does so in such a way as to make it at once, one of the most important books of reference for all who have to deal with the human entozoa. The author is a well-known authority on parasitic helminths and his contributions to helminthology include some of the standard monographs on the subject. In addition, he has had unrivalled opportunities of studying and teaching in China—the land, *par excellence* of the parasitic worms, where, indeed, modern helminthology had its birthplace. When to these qualifications, one adds the gift of a clear, lucid style, the result is the production of a volume which will appeal alike to helminthologists, hygienists, and clinicians.

The plan of the book is simple. The first few chapters are devoted to general considerations, including an excellent résumé of the often imperfectly understood Rules of Zoological Nomenclature, and an annotated list of current literature. Then follows a discussion on the parasitic worms, their zoological, pathological, clinical, and sanitary aspects. Every helminth which has been reported from man is included and this feature marks the volume as a work of reference rather than a student's textbook. The fourth and last section discusses technique and includes lists of apparatus, methods of collecting and preparing specimens, means of identification and finally lists of intermediate and reservoir hosts: the last group is by no means as complete as it might be, however.

The book is copiously and excellently illustrated and a large proportion of the drawings are original. References to literature are appended to each chapter and are well selected to include the more important works.

There are relatively few misprints and fewer mistakes; those that do occur are mostly minor ones. One important misprint, however, is the transposition of the words *Ancylostoma* and *Necator* on the map (on page 370) showing the distribution of the human hookworms: and on page 368, the author is in error in stating that the distal end of *each* of the spicules of *Necator* is provided with a delicate barb. (Actually, the two spicules fuse to form a single barb.) These are minor and easily corrected points, however, which are almost inevitable in a book of this magnitude.

Professor Faust has introduced no new species into this book, but he had made considerable alterations in classification and nomenclature. A number of new names are introduced and for medical readers the most important is the creation of a new genus *Mansonella* for the reception of "*Filaria*" *ozzardi*, originally described by Sir Patrick MANSON in 1897.

Professor Faust has to be congratulated on the production of an excellent piece of work, one which is not only of considerable academic interest, but which will prove of the utmost value to every student of parasitology in all its various aspects.

T. W. M. Cameron.

PEIPING UNION MEDICAL COLLEGE. **A Glossary of Bacteriological Terms (English-German-Chinese).**—144 pp. Issued by the Division of Bacteriology, Peiping Union Medical College, Peiping, China. [Received from the Peking Union Medical College, Peking.] [Review appears also in *Bulletin of Hygiene*.]

This Glossary places the English words first, and it is these which are in alphabetical order, even to the extent of such entries as "Preparation, unstained." It would seem therefore that the Glossary is intended to be

used by those who know German or Chinese and wish to read English writings, and considerable improvement could have been effected by having the English column revised by an English bacteriologist.

If a reviewer may make the suggestion without giving offence to those who speak and write a very ancient language, the adoption by China of the Roman alphabet would be of advantage to the scientists of that country no less than to those of western lands.

J. F. C. H.

HA SLAM (J. F. C.) [M.C., M.D. (Edin.), M.R.C.P. (Edin.), D.P.H., Assistant Director, Bureau of Hygiene & Tropical Diseases; Director of Library Services, London School of Hygiene & Tropical Medicine; formerly Government Medical Officer of Health, British Guiana]. **Recent Advances in Preventive Medicine. With a Chapter on the Vitamins** by S. J. COWELL, M.A., M.B., M.R.C.P., Professor of Dietetics in the University of London.—pp. viii+328. With 30 illustrations. 1930. London: J. & A. Churchill, 40, Gloucester Place, Portman Square. [12s. 6d.] [Review appears also in *Bulletin of Hygiene*.]

The plan of Dr. Haslam's book is shown in the following extract from the Preface :—

"In the days of Chadwick, preventive medicine meant little more than what we now call sanitation, and twenty years ago, or less, it would have been proper to begin this book with an account of what was new regarding water supply, drainage and sewage disposal. Preventive medicine has come to mean something more extensive . . . The modern programme of preventive medicine has been admirably sketched by Sir George Newman in his 'Outline of the Practice of Preventive Medicine,' and this book attempts to use that 'Outline' as a sort of framework round which to build a serviceable account of recent study of the problems of present-day preventive practice."

The modern outlook upon preventive medicine is sketched in an introductory chapter and the following chapters deal with recent work in most of the matters listed in NEWMAN'S "Provisional Articles of a National Policy in Preventive Medicine." The chapter titles indicate the scope of the book: Eugenics, Maternal Mortality, Wastage of Young Life, Childhood, Milk, Vitamins, Atmospheric Conditions, Hygiene in Industry, Active Immunization. Exhaustive treatment of any one of these subjects would, of course, fill a whole volume, but here attention has been restricted mainly to aspects of these subjects which have been acquiring special importance of late, but which, as yet, are but little noticed in standard text books. For example, the chapter entitled Hygiene in Industry, deals with industrial accidents, telegraphists' cramp, pulmonary asbestosis and sickness in the printing industry. The first of these includes the very interesting results obtained by GREENWOOD and WOODS and NEWBOLD, approaching the problem from the statistical side, and of FARMER and CHAMBERS who carried the research a stage further by psycho-physiological tests. The second also brings out the need for seeking the help of the psychologist as shown by MAY SMITH, CULPIN and FARMER. The third subject is a new disease entity in industrial pathology, and the fourth is a good example of the need (and difficulty) of arriving at exact knowledge of industrial morbidity as a prelude to elucidating causative factors.

Readers of the *Bulletin of Hygiene* will find here connected accounts of many of the matters which have formed the subjects of reviews and summaries published in its pages.

A. G. B.

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CAMERON (Thomas W. M.). **Observations on a Parasitological Tour of the Lesser Antilles.**—*Proc. Roy. Soc. Med.* 1929. May. Vol. 22. No. 7. pp. 933-941 (Sect. Trop. Dis. & Parasit. pp. 37-45).

An interesting sketch of the British islands of the Lesser Antilles—commentative and reflective rather than novel. We are reminded that malaria existed in Barbados up to the end of the eighteenth century and of the tardy and infirm recognition of its recent re-appearance there; of the early clinical descriptions of the formerly prevalent "Barbados leg," and of the gradual decrease of that locally-distinguished form of elephantiasis. The evidence that syphilis was brought to Europe from the West Indies is emphasized. The ubiquity of the yellow-fever mosquito, and the notoriety of the "bête rouge," jigger, and fer-de-lance are confirmed. A decrease of malaria in St. Kitts is attributed to anti-mosquito recommendations made by Dr. George Low in 1902. The presence of *Bertiella* in monkeys at St. Kitts is reported and a case of that infection in a girl in that island. In St. Kitts in certain tracts watered by permanent streams bilharziasis is not uncommon; here prophylaxis is complicated by the existence of the infection in the monkeys. Here, too, the author was able to infect the predominant freshwater snail, *Planorbis guadaloupensis*, experimentally. Commenting on the prevalence of hookworm in these islands, the author of course insists on the fact that cure is merely palliative without sure prevention of re-infection, that this again is not merely a matter of providing latrines unless the latrines are used; that this again "implies education, which in turn implies prosperity; for money and the correct spending of money is the crux of the whole question." [Implies education—Yes; but as Portia says, "If to do were as easy as to know what were good to do—; but this reasoning is not in the fashion."]

A. Alcock.

CLÉMENT. Contribution à l'étude de la parasitologie de la Guadeloupe. [**A Contribution to the Parasitology of Guadeloupe.**—*Ann. de Méd. et de Pharm. Colon.* 1929. July-Aug.-Sept. Vol. 27. No. 3. p. 459.

From this bare list multiple infestations by intestinal parasites seem to be as common in Guadeloupe, among the native population,

as they are elsewhere in the tropics. They were found in 605 of 764 stools examined, the species and their respective recurrences being as follows: *Necator americanus* 179 times, *Ascaris lumbricoides* 344, *Trichocephalus trichiuris* 365, *Schistosoma mansoni* 107, *Strongyloides stercoralis* 47, *Entamoeba dysenteriae* 57, *Balantidium coli* 4, and various Flagellates 50 times. Blood parasites found in 63 of 210 films examined were *Plasmodium vivax* 37 times, *P. praecox* 17, *P. malariae* 4, *Microfilaria Ozzardi* 6 times.

A. A.

BRUMPT (E.). Splénectomie et infections parasitaires. [**Splenectomy and Parasitic Infections.**]—*Jl. Egyptian Med. Assoc.* 1929. Mar. Vol. 12. No. 3. [In Egyptian. French summary pp. 31-37.]

This is an interesting discourse on the progress during the last forty years or so of knowledge of the defensive powers of the spleen against parasitic infections. The author assigns to J. H. ROGERS (1888) the first deliberate attempt to determine the effect of splenectomy upon the course of a specific infection; his experiments were made with anthrax, in rabbits, and from the discordant results it was concluded that the influence of the spleen was small. After ROGERS a host of authors are mentioned who in various ways accumulated evidence of bactericidal and agglutinating properties possessed by the spleen, notwithstanding the notorious fact that in certain chronic parasitic infections (leishmaniasis, malaria, relapsing fever) that organ showed up as a shelter where the parasites lurked and made increase in the intervals between relapses. The author then reviews, seriatim, a multitude of purposive and accurate observations made by various well-known authorities on the effects of splenectomy upon a specific chronic infection—spirillum, leishmania, trypanosoma, plasmodium, haemogregarina, piroplasma and similar forms, and Bartonella (Grahamella)—all pointing with one accord to the defensive functions of the spleen. The paper is a valuable summary of recorded fact, dates, and authorities, but there is not a bibliography.

A. A.

RAO (H. Srinivasa). **The Aquatic and Amphibious Mollusca of the Northern Shan States, Burma.**—*Records Indian Museum.* 1928. Vol. 30. pp. 399-468. With 28 text figs. & 3 plates (1 map). [34 refs.]

In his survey of the aquatic and amphibious mollusca, which are well represented in the Northern Shan States, the author examined for fork-tail cercariae every species of freshwater mollusc that he collected. The result was negative; indeed, with the exception of two species (*Indoplanorbis exustus* and *Melanoides tuberculatus*) that harboured Xiphidio- and Amphistome cercariae, all the species in the area surveyed were free from Trematode parasites of any sort. Moreover, the genus *Oncomelania* was not represented. Enquiries at three local hospitals showed that no further cases of schistosomiasis had been recorded since CULLEN's report in 1924 [see this *Bulletin*, Vol. 22, p. 471], although the immigration of Chinese coolies from Yunnan had not diminished within the last three years.

All these facts, as the author says, tell against any imminent risk of the introduction of schistosomiasis into Burma. "However, the discovery by SEWELL, in 1919, of a species of cercaria morphologically identical with the cercaria of *S. japonicum* in *Indoplanorbis exustus* from Calcutta and Wynaad in South India, and in *Limnaea acuminata* from Calcutta, leaves the question of the probable spread of schistosomiasis in India and Burma still open." Both these species were common in the ponds and pools surveyed in the present expedition.

A. A.

PIROT. Index parasitaire intestinal des matelots indigènes du recrutement indochinois, embarqués sur un bâtiment des forces navales en Extrême-Orient. [**Parasite-Index of Indochinese Lascars.**]—*Arch. Méd. et Pharm. Nav.* 1929. Jan.-Feb.-Mar. Vol. 119. No. 1. pp. 135-145. [1 ref.]

A report on faecal examination of 37 Indochinese lascars. Parasites were found in 36 of them, including 18 double, 8 triple, and 3 quadruple infestations. *Necator americanus* occurred in 27, *Trichocephalus* in 20, *Ascaris* in 18, *Strongyloides stercoralis* in 3, *Oxyuris* in 2, *Clonorchis sinensis* in 1, *Taenia saginata* in 1; *Entamoeba* of dysentery in 3, *E. coli* in 2, *Endolimax* in 1, *Chilomastix mesnili* in 1. The number of examinations was at least two in each case, but occasionally four or five, and at each individual examination two specimens were scrutinized.

A. A.

TISSEUIL (J.). Index du parasitisme intestinal à Nouméa. [**Intestinal Parasite Index at Noumea.**]—*Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 334-336.

The intestinal parasite index at Noumea (New Caledonia) calculated from the evidence of 1,592 stools examined in the year 1928, of which 982 were positive, is 62.46 per cent., composed as follows: Spirilla, 2.95 per cent. positive; dysenteric amoeba, 26.49; *Entamoeba coli*, 8.75; *Chilomastix*, 0.81; *Lambliia*, 20.46; *Trichomonas*, 1.73; *Blastocystis*, 10.18; *Ancylostoma*, 30.14; "Anguillules," 7.63; *Trichocephalus*, 9.76; *Ascaris*, 4.17. A single species of parasite was present in 727 stools, two species in 206, three species in 44, and four species in 5.

A. A.

RILEY (William A.). Protozoal Infestations of Ex-Service Men in Minnesota: Analysis of Two Hundred and Six Cases.*—*Jl. Amer. Med. Assoc.* 1929. May 18. Vol. 92. No. 20. pp. 1661-1662. [7 refs.] [Zool. Dept., Univ. of Minnesota.]

Of 500 hospital cases referred for specific investigation 162 revealed protozoa in the stools, including 35 cases of double, 7 of triple, and 3 of quadruple infection. The specific percentages for the whole 500 were for *Entamoeba histolytica* 1.4, for *E. coli* "approximately 14.0," *Endolimax nana* 11.2, *Giardia lamblia* 5.0. *Trichomonas*, *Chilomastix*, and two instances of *Dientamoeba fragilis* were observed also. All the

* This figure is misleading. It is the number of protozoal infections, not that of patients.

162 positive cases were from patients with gastro-intestinal, neurasthenic or other suspicious symptoms, and at least three examinations were made in each case.

A. A.

- i. ZDRODOWSKI (P.) & VOSKRESSENSKI (B.). Sur la répartition et l'épidémiologie des infections intestinales par les protozoaires en Azerbaidjan. [**The Distribution and Epidemiology of Intestinal Protozoan Infestations in Azerbaijan.**]—*Arch. Inst. Microbiol. et Hyg. d'Azerbaidjan*. 1929. Vol. 1. No. 1-2. pp. 97-114. [14 refs.] [In Russian. French summary pp. 153-155.]
- ii. VOSKRESSENSKI (B.). Trois cas de la coccidiose humaine en Azerbaidjan. [**Three Cases of Coccidiosis in Man in Azerbaijan.**]—*Ibid.* pp. 115-120. With 1 text fig. [7 refs.] [In Russian. French summary p. 155.]

i. A survey of the carriers of intestinal protozoa among the natives of Azerbaijan. An "enriched" specimen from a single stool from 1,146 persons showed 852 infested with cysts, the infestation being single in 35.6 per cent., double in 34.5, triple in 19.6, quadruple in 9.2, quintuple in 1.0, and sixfold in 0.1. The species encountered were *Entamoeba coli*, in 53.0 per cent.; *E. histolytica*, in 32.5; *Endolimax nana*, in 22.9; *Iodamoeba buetschlii*, in 22.9; *Lambliia*, in 14.0; *Chilomastix mesnili*, in 6.5, and in 3 cases *Isospora belli*. The high percentage of *E. histolytica*, equally in summer and in winter, accords well with the extensive epidemics of dysentery in summer and the prevalence of liver-abscess among the population.

ii. Appear to be the three cases listed above.

A. A.

DESCHIENS (R.). Chimisme gastrique et infections parasitaires du tube digestif. [**Gastrochymy and Intestinal Parasitic Infestations.**]—*Ann. Inst. Pasteur*. 1929. Oct. Vol. 43. No. 10. pp. 1353-1369. [6 refs.]

The author has tested by experiment the common belief that normal or excessive gastric acidity is deterrent to infestation by intestinal parasites, particularly protozoa, and his observations—so far as protozoa are concerned; research on intestinal worms is in progress—contradict that belief.

On the one hand, he compared the gastric acidity of 42 enteropathic patients having evidence of infestation by intestinal parasites, with that of 50 such patients not presenting such evidence, with the following results:—

	The infested.	The not infested.
Those with deficient acidity ...	31 per cent.	34 per cent.
Those with normal acidity (0.17 per cent. HCl) ...	33 per cent.	26 per cent.
Those with excessive acidity ...	36 per cent.	40 per cent.

On the other hand, he tested the resistance to artificial digestion by gastric juice, both of normal acidity and of acidity increased up to 0.62 per cent., of cysts of *Entamoeba dysenteriae*, *E. coli*, and *Giardia*

intestinalis, and found that "two to three hours at a temperature of 37° C. did not destroy the vitality of at least 12.5 per cent. of the cysts of these protozoa." The technical details are to be found in the paper.

A. A.

HEGNER (Robert). **Transmission of Intestinal Protozoa from Man and other Animals to Parasite-Free Fowls.**—*Amer. Jl. Hyg.* 1929. May. Vol. 9. No. 3. pp. 529–543. [5 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The object of these experiments is not only to determine whether domestic fowls may be capable of transmitting human intestinal protozoa, but also to obtain light on the "host-specificity" question. Fowls were used because easily obtainable and maintainable free of infection, being enlisted as four- or five-day chicks. The protozoa used (21 species) were those commonly available. Most of the work was done with *Trichomonas muris*. In all 345 fowls were used.

"In all, 118 chicks were used in experiments with *Trichomonas muris*. Specimens were at least as active in the cecal contents of the chick as in the rat. Fowls 15, 16, and 37 days old were as susceptible to this trichomonad as 3 or 4 day chicks. Infections were maintained in certain fowls for 191 days and would probably have persisted for a longer period; these could hardly be considered temporary infections. What appeared at first to be individual differences in susceptibility were probably due to failure to gain entrance to the ceca or to some other mechanical factor. Variations in the numbers present in cecal material were observed from time to time; these were probably due to the fact that large numbers of trichomonads are evacuated with the cecal contents and a correspondingly long period is necessary for multiplication. Parasite-free chicks became infected when confined in the same cage with infected birds. Heavy infections with *T. muris* were obtained in chicks when fed on a steak or liver diet, whereas in rats this organism rapidly decreases in numbers when the hosts are fed on a steak diet (Hegner, 1923; Ratcliffe, 1928).

"Six other species of *Trichomonas* were inoculated into chicks as indicated in the table (page 533)."

"Cysts of *Chlomastix mesnili* from man gained entrance to the ceca of chicks when inoculated per os and per rectum but failed to excyst. Infections were obtained with trophozoites of both this species and with *C. bettencourti* from rats but these were followed for only a few days.

"Cysts of *Giardia lamblia* from man and *G. muris* from rats excysted in the intestine within from 45 minutes to 1½ hours after inoculation per os, but whether or not these would live in the ceca was not determined.

"*Balantidia* from pigs and guineapigs when inoculated per os or per rectum were found alive in the ceca for from 2 hours to 48 hours after the operation. Their numbers were small and multiplication probably did not take place.

"Only 2 of 17 chicks inoculated with the dysentery amoeba of man, *Endamoeba histolytica*, became infected; these were inoculated per rectum with material from an infected kitten and remained infected for 2 days.

"Cysts of *Endamoeba coli* and *Iodamoeba williamsi* from man did not excyst in chicks.

"One cyst of *Endolimax nana* from man excysted in a chick and one containing a moving amoeba was observed.

"Trophozoites of *Endamoeba muris* from rats and of *E. cobayae* from guineapigs were recovered from the cecal material of chicks from 20 hours to 5 days after inoculation per os or per rectum.

"These cross-infection experiments demonstrate that fowls, especially young chicks, are very susceptible to certain intestinal protozoa of man

and other animals. Further work needs to be carried on with amoebae, *Chilomastix* and *Giardia*, but the evidence with respect to *Trichomonas hominis* and *T. buccalis* from man and trichomonads from other animals is very convincing. The results indicate that chicks may become infected by ingesting these organisms and may remain infected, and deposit flagellates in their feces for at least several months. Where sanitary conditions are inadequate fowls may thus become important transmitting agents of human intestinal trichomonads. The preliminary data regarding other flagellates and amoebae indicate that these may likewise be transmitted to a certain extent by fowls.

"These experiments also concern the problem of host-parasite specificity. This is especially true of the trichomonads. These flagellates are usually considered to represent distinct species in different hosts although morphological differences are exceedingly difficult to distinguish. The data obtained from these cross-infection experiments suggest that the trichomonads of fowls, rats, pigs, guinea-pigs, monkeys and man may actually belong to one species. The careful study of material from various hosts before and after inoculation into chicks should help solve this problem. Work of this type is now in progress."

A. A.

DA CUNHA (Aristides Marques) & MUNIZ (Julio). [In Portuguese & German.] Nota sobre os parasitas intestinaes do *Macacus rhesus* com a descripção de uma nova especie de *Octomitus*. Bemerkungen über Darm-Parasiten des *Macacus rhesus* mit Beschreibung einer neuen Art von *Octomitus*. [*Intestinal Parasites of Macacus rhesus*.]—*Inst. Oswaldo Cruz, Supplemto das Memorias*. 1929. Jan. & Feb. No. 5. In Portuguese pp. 34–35. With 1 plate. In German pp. 36–37.

The Rhesus monkeys imported for study of yellow fever often suffer from enteritis, and in their evacuations several species of intestinal protozoa very like those occurring in man are found. Exceptional is the *Octomitus pitheci*, a new species now described and figured. Of the others, an Entamoeba is very like *E. coli*, a *Chilomastix* seems identical with *C. mesnili*, and a *Balantidium* is identical with *B. coli* (and distinct from the *B. aragai* found in the S. American monkey *Cebus caraya*). There are also two forms of *Trichomonas*—of which one is akin to *T. hominis*, and the other, and larger, is somewhat different both from *T. hominis* and from the *T. macacovaginae* described by HEGNER.

A. A.

CHODOUKINE (N. I.). Les protozoaires de l'intestin des puces de chien à Taschkent. [*The Intestinal Protozoa of Dog-Fleas in Tashkent*.]—*Pensée Méd. d'Usbékistane*. Tashkent. 1927. Dec. No. 3. pp. 69–73. [8 refs.]. [In Russian. French summary p. 136.]

The author records the examination of 562 fleas from healthy dogs and 230 from dogs suffering from canine leishmaniasis. The fleas comprised *Ctenocephalus canis*, *C. felis* and *Pulex irritans*. The percentages infected with leptomonas in the two groups were 14·5 and 13·04. In addition to the leptomonas 35–40 per cent. of the fleas showed *Nosema pulicis*, 4 per cent. *Crithidia pulicis*, 0·1 per cent. *Legerella parva*. Of larval fleas examined 3·07 per cent. harboured *Leptomonas ctenocephali*, 0·27 per cent. *Crithidia pulicis*, 2·23 per cent. *Nosema pulicis*, and 100 per cent. what is possibly *Actinocephalus parvus*.

C. M. W.

HINSHAW (H. Corwin). **Correlation of Protozoan Infections of Human Mouth with Extent of Certain Lesions in Pyorrhea Alveolaris.**—*Proc. Soc. Experim. Biol. & Med.* 1926. Vol. 24. pp. 71-73.

From cultivation in Boeck's medium of material from the gums of 280 individuals the author observes that protozoan parasites do not occur in the normal mouth. *Entamoeba gingivalis* occurs in most (or all) cases of early pyorrhoea, and *Trichomonas buccalis* frequently in cases of advanced pyorrhoea and occasionally after effectively treated cases. *T. buccalis* "is definitely antagonistic to *E. gingivalis* in vitro."

A. A.

RATCLIFFE (Herbert L.). **The Relations of *Entamoeba muris* and *Chilomastix bettencourti* to the Diet and Intestinal Conditions of Rats.**—*Jl. Parasit.* 1929. Dec. Vol. 16. No. 2. pp. 75-80. [4 refs.]

The object of this study was to determine (for certain comparative reference) the reactions of *Entamoeba muris* and *Chilomastix bettencourti* to specific changes in the diet of their rat hosts. A list of the different experimental diets is given. Observations at 25-day intervals showed that infestations with both species were light when the rats were on a diet that encourages the predominance of aciduric bacteria. On a diet that promotes the growth of Gram-negative bacteria both species increased in numbers. A diet that increases the proteolytic anaerobes and decreases both the Gram-negative and Gram-positive aerobes caused a decrease of both species of Protozoa.

A. A.

HEGNER (Robert) & SCHUMAKER (Eugene). **Some Intestinal Amoebae and Flagellates from the Chimpanzee, Three-Toed Sloth, Sheep and Guinea-Pig.**—*Jl. Parasit.* 1928. Sept. Vol. 15. pp. 31-37. With 11 text figs. [2 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The authors survey the various *histolytica*-like and *coli*-like amoebae that have been found by divers observers in various species of Primates, and they figure cysts of two such amoebae and also an *Iodamoeba williamsi*-like cyst found by them in a defunct chimpanzee captive. They appear to incline to the opinion that, irrespective of a multitude of different names, the several forms included in this triad are identical with the corresponding forms in man. They also describe and figure as new species an *Entamoeba*, a *Giardia*, and an *Embadomonas* from the three-toed sloth, and an *Embadomonas* from the guineapig and another from the sheep. [The species from the sloth are all named "bradypi." May we plead that "bradypodus," the correct inflexion, has a more finished look ?]

A. A.

MAYNE (Bruce). **The Nature of the 'Black Spores' associated with the Malaria Parasite in the Mosquito and their Relationship to the Tracheal System.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 109-134. With 18 figs. on 4 plates. [35 refs.]

This is a full and critical account of the history of the "black spores" from beginning to end. From his own observations the author agrees that they are chitinous, and further concludes that they

are merely thickenings of the tracheal tubules (which, as is well known, are lined with chitin). Furthermore, from the fact that he found them as often in mosquitoes fed on sparrows *not* infected with malaria parasites as in mosquitoes fed on infected sparrows, and also in male and female mosquitoes that had not been fed at all, as well as in house-flies, he justly concludes that they cannot have any specific connexion with malaria.

A. A.

BRUG (S. L.). **Observations on a Culture of *Entamoeba histolytica*.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1928. Vol. 17. Pt. 2. pp. 225-233. With 2 text figs., 1 diagram & 33 figs. on 2 plates. [8 refs.] [Med. Lab., Weltevreden.]

The author disclaims intention to give a full report of his experience with entamoebic cultures; rather he records some observations which are in contradiction (so he states) with those observed by other authors, or which have found little or no consideration in the literature.

His findings are well illustrated by figures; they are interesting, but of purely protozoological interest, and as they must be set out in careful and rather minute description they cannot be justly subjected to summary. Some of his observations may be mentioned. Using silver and copper preparations in various ways he failed to rid *E. histolytica* culture of bacterial contamination. Seven attempts to cultivate *E. coli* failed; and with *E. histolytica* most attempts failed due, he suggests, to the peculiar intestinal flora of the E. Indies.

His observations do not support the view that encystation of *E. histolytica* is induced by unfavourable conditions, but rather the contrary; and he cites in support clinical observations on the regaining of cyst producing capacity of the parasites after emetine therapy. "Only thoroughly sound amoebae can produce cysts—invalids cannot." He has not been able to trace anything in cultures suggesting mitosis or chromosomes; nuclear division of *E. histolytica* was amitotic. Phagocytosis, even cannibalism, of *E. histolytica*, was noted, and a careful description is given of the process of "drinking," or phagocytosis of fluid by the amoeba. Certain "black bodies" probably extruded by the nucleus were noted.

H. M. Hanschell.

SCHACHSUWARLY (M.). Ueber die Beeinflussung von *Entamoeba histolytica* in der Kultur durch die Konzentration des Mediums und durch Bakteriophagen. [**Influence of Concentration of Medium and of Bacteriophage on *E. histolytica* in Culture.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Mar. Vol. 33. No. 3. pp. 129-134. [Inst. for Ship & Trop. Diseases, Hamburg.]

The experimental work is fully set out and results tabulated. On the data thus obtained the author's conclusions are:—

Abrupt raising and lowering of the NaCl content in the culture medium prevents encystment of *E. histolytica*. The lower limit for multiplication of *E. histolytica* is 0.05 per cent., the upper limit 1.5 per cent., NaCl content in fluid medium. High salt concentration brings about a viscid consistency of the endoplasm. Addition of bacteriophage (Shiga-Kruse, Flexner,

Y, and *Bacterium coli*) prevents encystment of *E. histolytica*. Shiga-Kruse bacteriophage inhibits multiplication of *E. histolytica* in culture; while Flexner, Y-, and *Bact. coli* lysates do not.

H. M. H.

GRIDNEVA (W. M.). [Einfluss der Salzkonzentrationen auf das Wachstum und Morphologie der Amöben in den Kulturen.] [**Influence of Salt Concentration on Growth and Morphology of Amoebae in Cultures.**]—*Nachrichten d. Tropischen Medizin*. Tiflis. 1929. Jan. Vol. 2. No. 1. [In Georgian script. German summary pp. 70–71.]

Increasing the salt concentration of the culture medium brings about alteration in the morphology of the amoeba; so much so that an amoeba may assume then features which are characteristic for other species. The gradual decrease in size of the pulsatile vacuole indicates that the absence of this vacuole in parasitic or saprophytic amoebae is not a specific character of parasitic amoebae but rather one dependent on the salt concentration of the medium.

H. M. H.

DESCHIEENS (R.). Recherches sur la culture d'*Entamoeba dysenteriae* (pH, évolution chimique, simplification). [**On the Cultivation of *Entamoeba dysenteriae*.**]—*C.R. Soc. Biol.* 1929. June 28. Vol. 101. No. 22. pp. 665–667. [1 ref.]

The author here discusses in condensed detail his experiences in the process of cultivation of *Entamoeba histolytica* in a simplification of an improvement (introduced by DOBELL and others named) of the Boeck and Drbolav medium proposed by himself in *C.R. Soc. Biol.*, 1927, Vol. 96, pp. 1,356.

A. A.

FREEMAN (L. B.). **Studies on Amoebae from Human Hosts.**—*Jl. Parasit.* 1929. Sept. Vol. 16. No. 1. pp. 1–12. With 13 figs. on 1 plate. [9 refs.] [Zool. Dept., Univ. of Pennsylvania, Philadelphia.]

The following is a summary by the author himself, who makes no reference to DOBELL's recent paper (*Bulletin*, Vol. 26, pp. 795–6) and appears to be unacquainted with the phenomena of excystation therein described for *Entamoeba histolytica*.

"1. The presence in the human intestine of an amoeba corresponding in essentially all morphological details to the description of *Councilmania lafleuri* (Kofoid and Swezy, 1921) has been confirmed.

"2. The pathogenic properties of this amoeba were not completely demonstrated although there was evidence that it may be pathogenic.

"3. Amoeba were recovered from the ceca of rats to which cysts from human feces had been fed, but it could not be established that these amoebae were the same species as those fed.

"4. The phenomenon of 'budding' in the encysted forms of this amoeba as seen in prepared slides is not a biological process, but is due to the strength, temperature and type of fixing agent employed in the preparation of the material, and to the race and condition of the cysts.

"5. Since the validity of the genus *Councilmania* depends primarily upon the biological significance of 'budding' it is suggested that the correct name for this amoeba is *Endamoeba lafleuri*, assuming, for the moment, that the name *Endamoeba* is available for these amoebae from human hosts."

A. A.

ANDREWS (Mary Neville). **Observations on *Trichomonas vaginalis* Donné, 1837 ; with Particular Reference to its Incidence in England and its Cultivation.**—*Jl. Trop. Med. & Hyg.* 1929. Sept. 2. Vol. 32. No. 17. pp. 237-240. With 5 figs. [14 refs.] [School of Hyg. & Trop. Med., London.]

The author quotes statistics from several countries in Europe and America illustrating the fairly common occurrence of *Trichomonas vaginalis* in vaginal secretion, especially in Russia. She also discusses at length the technique of cultivating the creature, the medium finally recommended being a 2 per cent. agar slope covered with serum-saline-citrate lotion pH 7.6, since in it bacteria are stayed and subinoculations at weekly intervals are sufficient.

In all, 100 women were examined (12 gynaecological, 18 antenatal, and 70 venereal) from the neighbouring Royal Free Hospital, and the *Trichomonas* was found in 20 of them—in 5 instances only by culture. Of these 20 positives 13 were supplied from 28 cases of gonorrhoea, 4 from 8 cases of *Bact. coli* vaginitis, 2 from the antenatal patients, and 1 from 34 chronics. Of 3 children also examined (2 gonorrhoeas and 1 pruritus vulvae) all were free of the flagellate. On the whole, no evidence was obtained that the *Trichomonas* was pathogenous.

In the vaginal secretion *T. vaginalis* is larger than *T. hominis*, there are four anterior flagella, and the undulating membrane does not run the whole length of the body. In culture it is smaller, the undulating membrane extends beyond the body as a free flagellum, and it becomes morphologically indistinguishable from *T. hominis*.

A. A.

HEGNER (Robert). **The Viability of Trichomonad Flagellates in Milk.**—*Jl. Parasit.* 1929. Sept. Vol. 16. No. 1. pp. 47-48. [1 ref.] [Johns Hopkins School of Hyg. & Public Health, Baltimore.]

The author refers to his experiments demonstrating the ability of *Trichomonas hominis* to survive transmission through the housefly and its inability to survive in water. He now summarizes experiments showing that it can survive, even up to 48 hours, in milk.

"Human intestinal trichomonads of the type with five anterior flagella (*Pentatrichomonas*) were grown in culture and various quantities of the culture medium added to pasteurized milk. The following mixtures were set up and maintained at room temperature: (1) 10 cc. of culture to 40 cc. of milk, (2) 5 cc. of culture to 45 cc. of milk, (3) 3 cc. of culture to 47 cc. of milk, and (4) 1 cc. of culture to 49 cc. of milk. These mixtures were examined at frequent intervals during a period of eight hours and active, apparently normal, trichomonads were recovered from all of them at every examination. At the end of 24 hours apparently normal specimens were recovered from the mixture of 10 cc. of culture material to 40 cc. of milk and this mixture remained positive for the succeeding 24 hours. No trichomonads, however, were found in the other three dilutions at the end of 24 hours, probably because they were present in such small numbers that they could be recovered only with great difficulty. These experiments supplement the work previously reported and render practically certain the transmission of human intestinal flagellates by flies and unsanitary conditions to human beings as a result of the contamination of milk and probably through types of food and drink."

A. A.

VISHER (John W.). **Vesical Infection with *Trichomonas vaginalis*.**—*Jl. Amer. Med. Assoc.* 1929. June 22. Vol. 92. No. 25. pp. 2098–2099. [14 refs.]

A case in a woman of 32 years admitted to hospital with fever and symptoms of cystitis and acute pyelitis. The bladder contained a few pus-cells and a multitude of living flagellates identified as *Trichomonas vaginalis*.

A. A.

DESCHIENS (R.) & KIPCHIDZÉ (N.). *Trichomonas de la bouche des singes.* [**A *Trichomonas* in the Mouth of Monkeys.**]—*C.R. Soc. Biol.* 1929. Nov. 15. Vol. 102. No. 30. pp. 518–520.

The *Trichomonas*, which is considered to be identical with *T. elongata* found in the human mouth, was observed in the mouth of *Papio sphinx* and *Macacus rhesus*, in the former species associated with an *Entamoeba* of the *gingivalis* type.

A. A.

GABALDÓN (Arnoldo). Nota sobre el desarrollo "in vitro" de "*Chilomastix mesnili*." [**Cultivation of *Chilomastix mesnili* in vitro.**]—*Gac. Méd. de Caracas.* 1929. (25° Aniv. Acad. Nac. de Med. Numero extraord.) pp. 79–82. With 2 text figs. [8 refs.]

The author has cultivated *Chilomastix mesnili* in media with faeces from the caecum of rats and guinea-pigs as a base and also in Schourenkowa and Lisovsky's medium. He had good results with both, and in the former has made 39 subcultures in 5 months. The optimum reaction of the medium lies between pH 6·8 and 7·2, but sudden transfer from one extreme to the other retards reproduction for a few days. When transferred to room-temperature they take a form which he regards as the precystic stage, the cytoplasm free of bacteria, and a swelling posteriorly, while the flagella shrink and become sluggish.

H. Harold Scott.

SCHEIDEL (Herbert) Ueber die Pathogenität von *Lamblia intestinalis*. [**Pathogenicity of *L. intestinalis*.**]—*Med. Klin.* 1929. Dec. 27. Vol. 25. No. 52 (1307). pp. 2001–2003. [14 refs.] [*Med. Clinic, Univ., Heidelberg.*]

In discussing whether or not *Lamblia* is to be regarded as pathogenous Dr. Scheidel takes no notice of authors outside the German record and therefore writes as if the question had not been answered in something like a final affirmative by the rest of the world. He gives, however, concise and suggestive abstracts of four cases, all pointing to the hepatic region, where appropriate tubage discovered a multitude of living *Lamblias* in the duodenal juice or in the bile reflux. In one case having sanguineous and slimy diarrhoea concurrent the flagellates seemed to be the exclusive cause. He therefore decides that it is "quite possible and probable" that a heavy infestation by *Lamblia* has a pathogenous significance, although further observations on this question are necessary; at any rate, that by reducing the number of the *Lamblias* an abatement of the patient's complaints can be effected.

A. A.

LABBÉ (Marcel), NEPVEUX (Fl.) & JUSTIN-BESANÇON (L.). Cirrhose hypertrophique pigmentaire du foie et lambliaose intestinale. [**Intestinal Lambliaosis and Hypertrophic Cirrhosis of the Liver.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1929. July 15. 3rd Ser. Vol. 45. No. 24. pp. 1007–1011.

Although the authors are convinced that lamblia infestation is often a mere sequence of enteritis, they present here a case where, in their opinion, a state of chronic hepatitis and haemorrhagic duodenitis must be attributed to a prodigious infestation by that parasite.

The authors conclude that all these pathological changes, as well as the chronic enteritis, were caused by the heavy *Lamblia* infestation—a conclusion fortified in their opinion by the fact that one of them in the course of his experience had observed several cases—two of which are briefly abstracted—of great enlargement of the liver concomitant with the existence of *Lamblia* in the duodenal bile and the gall-bladder.

A. A.

UMIDOWA (S. I.) & SCHWARZ (A. L.). [Ein Subdiaphragmatischer Abscess mit *Lamblia intestinalis*.] [**Subdiaphragmatic Abscess associated with *Lamblia intestinalis*.**]—*Pensée Méd. d'Usbekistane*. Tashkent. 1927. Dec. No. 3. pp. 110–112. [4 refs.] [In Russian. German summary p. 139.]

This case began as an intense bellyache, passage of green liquid stools free from blood or slime, and fever. In the course of 24 days all symptoms abated, except fever. Under hospital observation now, the discovery of dulness below the right scapula suggested exploratory puncture, which eventually tapped stinking pus full of living lamblia, the patient still with fluctuating fever and passing one or two pulpy stools daily. An operation revealed a deep abscess, big as a hen's egg, beneath the diaphragm.

A. A.

MALLIA (Guglielmo Rosa). Contributo diagnostico e terapeutico alla lambliaosi intestinale (con due casi osservati in Sicilia, nel Ragusano). [**Diagnosis and Treatment of Lambliaosis.**]—*Riforma Med.* 1929. Sept. 14. Vol. 45. No. 37. pp. 1258–1260. [8 refs.]

Reports in great detail of two patients who had suffered on and off for some years with attacks of diarrhoea resulting in anaemia and debility. *Lamblia* were found in the stools. The first soon recovered when given stovarsol, the second after injection of arsenobenzol, stovarsol not proving very effective.

H. Harold Scott.

TEITGE (H.). Die Lambliaosis bei den Bergarbeitern des Ruhrgebiets als Ursache von Magenbeschwerden. [**Lambliaosis as a Cause of Gastro-intestinal Disorder in Ruhr Miners.**]—*Klin. Woch.* 1929. June 18. Vol. 8. No. 25. pp. 1175–1176. [19 refs.]

Of the 200 patients in a Ruhr mines infirmary [unspecified] in the Ruhr, 110 were suffering from gastro-intestinal disorders, 23 of the sufferers being found infected with *Lamblia*. In 3 cases the parasite was found in the gall-bladder. Neosalvarsan injections (0.3 gm.) with purgation (Mag. Sulph.) and sulphur (6–9 gm.) per os was the treatment instituted.

A. A.

SAUTET (Jacques). Formation des kystes bleus de *Giardia intestinalis*. [Formation of the Blue Cysts of *Giardia intestinalis*.]—*Ann. Parasit. Humaine et Comparée*. 1929. May 1. Vol. 7. No. 3. pp. 193–195. With 1 text fig. [4 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The author has observed various stages in the history of blue cysts of *Giardia intestinalis*. They gradually become smaller, their contents become granulous and their nuclei and flagella disappear, and finally they burst and discharge the mortal remains of the parasite.

A. A.

SCHOURENKOVA (A. I.) & DEMINA (N. A.). Sur les relations entre l'*Enteromonas* da Fonseca 1915 et le *Tricercomonas intestinalis* Wenyon et O'Connor 1917. [On the Relation of *Enteromonas* of Fonseca 1915 and *Tricercomonas intestinalis* Wenyon and O'Connor 1917.]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 645–651. With 1 text fig. [1 ref.] [Trop. Inst., Moscow.]

In the faeces of a man from Daghestan (Caucasia) who had suffered for three years from diarrhoea alternating with constipation, the authors found living flagellates identical with FONSECA'S *Enteromonas hominis* and, after purgation, cysts identical with WENYON'S *Tricercomonas intestinalis*. In culture the flagellates were identical with WENYON'S form. The authors naturally agree with DOBELL that FONSECA'S names for genus and species (1915) hold the field.

A. A.

ROBERTSON (Muriel). **The Action of Acriflavine upon *Bodo caudatus*. A Study of Heritable Modification in a Non-Conjugating Protozoan and its Relation to Certain Aspects of Chemotherapy in Trypanosomiasis.**—*Parasitology*. 1929. Nov. Vol. 21. No. 4. pp. 375–416. With 23 graphs & 3 text figs. [4 pages of refs.]

This fine study of the action of acriflavine upon *Bodo caudatus* is stated to have been to some extent suggested by WERBITZKI'S discovery that under the influence of certain dyestuffs a definite modification of structure—the suppression of the parabasal body—could be induced in trypanosomes. The author, as is here fully expounded, did succeed in producing, through the influence of acriflavine, individual Bodos without the parabasal body, but not a strain permanently so modified, although she has not relinquished hope. Furthermore, she has isolated from the stock derived from a single Bodo, clones (each of them being a group of lineal descendants of a single Bodo) showing *inter se* different degrees of natural resistance to the drug, and among them clones which having once acquired a high resistance have retained it through prolonged cultivation (up to a year) in media free of the drug. "Evidence that drug-fastness . . . is due to the interaction of selective inheritance and the actual modification of the quality of the *Bodo* by evolution in the drug is given. The modification is not apparently a mutation, it is a heritable piling up of changes in a particular direction." "*Bodo caudatus* being an organism without conjugation and therefore without bi-parental inheritance and consequently lacking the re-organizing effect that such a periodic closing of the cycle produces, affords an example of a labile organism capable of being progressively altered within certain limits under the influence of the environment."

[The author's experiments suggest something more than this (since the Bodos must absorb the drug) when it is remembered that DARWIN in *The Origin of Species* gave some reasonable justification for the belief that chemical changes in the sap of an organism might be a cause of modification in structure.]

In addition to its fundamental biological interest the bearing of the facts on certain aspects of trypanosomiasis and chemotherapy—a matter outside the purview of this section—is discussed.

A. A.

GWÉLÉSSIANY (J.). Recherches sur le passage du *Trypanosoma lewisi* à travers les muqueuses et sur son rôle pathogène. [**Observations on the Penetration of the Mucosa by *Trypanosoma lewisi* and its Pathogenous Significance.**—*C.R. Soc. Biol.* 1929. May 31. Vol. 101. No. 18. pp. 281–283. [2 refs.] [Pasteur Inst., Paris.]

The author, using rats previously protected from risk of injury to skin and mucosa, and experimenting with citrated *Trypanosoma lewisi*-infected blood, conducted the following experiments. (1) Infected blood was carefully placed on the conjunctiva of 3 rats, and on the buccal mucosa of 3 others, and, for control, into the peritoneum of another, and in due course trypanosomes were found in the blood of one of the first 3, and in 2 of the second three, and in the control; as those that died after infection were found to have coccidiosis no conclusions can be drawn as to cause of death. Therefore (2) Infected blood was placed on the conjunctiva of 5 rats, on the buccal mucosa of 5 others, and into 1 control rat; and of these, 4 became infected through the conjunctiva, 3 became infected through the buccal mucosa, as well as the control. Three of those infected through conjunctiva, and all those infected through mucosa, as well as the control, died.

The author therefore concludes that *Trypanosoma lewisi* can travel through an intact mucosa and is pathogenous to rats.

A. A.

BRUYNOGHE (R.) & VASSILIADIS (P.). La splénectomie dans l'infection du *Tr. Lewisi*. [**Splenectomy in *Trypanosoma lewisi* Infection.**—*Ann. Soc. Belge de Méd. Trop.* 1929. June 30. Vol. 9. No. 2. pp. 191–195. [10 refs.] [Bact. Inst., Louvain.]

The author has studied the effect of splenectomy on the normal resistance of certain animals (in this case certain species of mice) to *Trypanosoma lewisi*. He found that in white mice, "wild" mice, and field-mice this resistance was not affected by splenectomy; but of 13 desplenated harvest-mice (*Mus minutus*) 5 became infected and showed numerous trypanosomes in their blood for several weeks. Some of them (3) died and some survived. In all but one of them there were concurrent changes in the blood (degenerations of the red cells and leucocytosis in 3 cases). The author, however, attributes the mortality to the infection with *T. lewisi*, since the one whose blood remained unaltered was one of the three that died.

A. A.

REGENDANZ (Paul). **Pathogenicity of *Trypanosoma lewisi* and Blood Sugar in Infections with *Trypanosoma lewisi* and *Bartonella muris ratti*.**—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 523–526. [10 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

In rats dying of *Bartonella* infection there is a final hypoglycaemia. *Trypanosoma lewisi* is sometimes pathogenous to rats, where there is a final hypoglycaemia. The author has observed a strong infection of *Bartonella* in spleen-entire rats as the result of a *T. lewisi* infection; but since *Bartonella* can be eliminated by neosalvarsan and other organic arsenicals that have no effect upon *T. lewisi* (which is susceptible only to arsenophenylglycin, so far as is known at present) no confusion need occur in experimental studies.

A. A.

LINTON (Richard W.). **Blood Sugar in Infections with *Trypanosoma lewisi*.**—*Ann. Trop. Med. & Parasit.* 1929. June 27. Vol. 23. No. 2. pp. 307–313. [13 refs.] [College of Physicians & Surgeons, Columbia Univ., New York]

The author briefly reviews what has been written on the proposition that the pathological results of a trypanosome infection are to be attributed not to the direct action of the parasites but indirectly to their effect in decreasing the blood-sugar of their host. His own experiments, pursued in normal rats, trypanosome-infected rats, and trypanosome-infected rats that were desplenated in an attempt to increase the gravity of their infection, show that the blood-sugar of rats is not—beyond the normal range of variation—affected by infections with *Trypanosoma lewisi*; but that a hypoglycaemia is developed during the terminal stage of infection with *Bartonella muris*.

A. A.

REGENDANZ (P.). Die multiple Teilung des *Trypanosoma criceti*, seine Entwicklung im Hundefloh und Übertragungsversuche auf den Hamster. [*Trypanosoma criceti*: **Fission, Development in the Dogflea and Transmission to the Hamster.**—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 44–54. With 4 text figs. & 20 coloured figs. on 1 double plate. [14 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The life cycle of *Trypanosoma criceti* as followed in these experiments from hamster (*Cricetus frumentarius*) to hamster through the dog flea (*Ctenocephalus canis*) is in general similar to that of *T. lewisi* as described by MINCHIN and J. D. THOMSON. From 7 to 11 days (on one occasion not until 21 days) after feeding on infected hamsters the fleas' faeces became infective, and from 9 to 12 days after a saline emulsion of the infected faeces was brushed on the tongue of young hamsters trypanosomes usually became apparent in the hamsters' blood. In the infected flea the trypanosomes at first were found attached to the fore end of the stomach just behind the proventriculus, and afterwards in the cloaca (end-darm). Intra-cellular forms were not seen.

The author describes and figures the grown form of *T. criceti* from the blood of the hamster in comparison with *T. lewisi*, *T. microti*, and *T. primatium*; and its multiple fission up to a final octuple stage, in

comparison with *T. primatum*, as well as the forms assumed by *T. criceti* in the dung of the flea—forms very similar to corresponding forms of *T. lewisi*.

The duration of the infection in the flea has not yet been determined ; in the hamster many months. Attempts to infect rats and guineapigs by means of infective flea-dung were unsuccessful ; nor did the rats that served as nurse to infected fleas become infected.

A. A.

ZOZAYA (Carlos). Ueber das Trypanosoma des Hamsters (*Cricetus frumentarius*). [**On the Trypanosome of the Hamster (*Cricetus frumentarius*)**].—*Cent. f. Bakt.* I. Abt. Orig. 1929. Vol. 110. No. 4/5. pp. 187–190. With 1 coloured plate. [9 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Once more the trypanosome (*T. criceti*) of the hamster is differentiated structurally from *T. lewisi*. Chemically it is here said to resemble *T. lewisi* in being indifferent to Bayer 205, neosalvarsan, and antimony, but not to arspenyglycin. Attempts to infect desplenated rats with *T. criceti* were not successful. Among the developmental forms of *T. criceti* in the flea intracellular forms were not observed. (It was observed that the hamster stood splenectomy well but did not develop Bartonella-anaemia.)

A. A.

HOARE (Cecil A.). **Studies on Trypanosoma grayi. 2. Experimental Transmission to the Crocodile.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. June 25. Vol. 23. No. 1. pp. 39–56. With 8 figs. on 4 plates. [25 refs.] [Human Trypanosomiasis Inst., Entebbe, Uganda.]

After a critical review of the history of *Trypanosoma grayi*—its discovery in the gut of *Glossina palpalis* and its consequent confusion with developmental stages of *T. gambiense*, and its later suspected connexion with the crocodile and monitor—the author describes in full and clear detail how, using flies (*G. palpalis*) and young crocodiles bred in the laboratory, he carried *T. grayi* through its entire life-cycle, from the guts of naturally-infected wild flies to young crocodiles and from young crocodiles thus infected to clean flies, and thus was able to prove its identity with the crocodile trypanosome, *T. kochi*. In the fly, as was known, the trypanosomes are found only in the midgut and hindgut, and the author shows that it is the forms in the hindgut—among which stumpy crithidia occur—that alone are infective to the crocodile. Infection of the crocodile takes place through the mouth, and the incubation period is 4 days. The local monitors do not harbour trypanosomes and all attempts to infect them with *T. grayi* failed.

A. A.

MACFIE (J. W. S.) & THOMSON (J. G.). **A Trypanosome of the Canary (*Serinus canarius* Koch).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 185–191. With 3 text figs. & 7 figs. on 1 plate. [4 refs.] [School of Hyg. & Trop. Med., London.]

An account is given of trypanosomes found in canaries used in chemotherapy experiments. The parasite was studied in the blood of about twenty canaries. As a rule, they were very scanty, but

occasionally they were more abundant, although the degree of infection was never heavy. The appearance of the parasites in the blood was irregular. As a rule, infection was benign, but the more heavily infected birds were ill; whether this was the effect of the abundance of trypanosomes is a matter of doubt. Smears of the organs did not show any concentration of the parasites, and no stages or forms were found in these situations differing from those present in the peripheral blood. The trypanosomes were sluggish, exhibiting little translatory movement. Their appearance in stained preparations is described.

It was observed that the canaries were always more or less infested with mites of the species *Dermanyssus gallinae*, and that a considerable proportion of the mites were infected with flagellates. The various forms of parasites discovered in the mites are described. The occurrence of a trypanosome in the blood of canaries, and its association with developmental forms of a trypanosome in the body cavity of the mite which feeds on these birds, strongly suggests, without complete experimental evidence, that the mite acts as the transmitting agent. Until, however, the difficulty of obtaining absolutely clean canaries free from mites from the date of hatching, and mites which had never fed on birds, has been overcome, conclusive proof of the relationship of the trypanosome in the mite and canary is lacking. As the life history of the trypanosome in the mite is confined to the body cavity, the method of transmission must be by crushing of the vector and liberation of metacyclic trypanosomes. There is no evidence that the intestinal excreta or the salivary glands of the mite contained trypanosomes.

W. Yorke

LEVADITI (C) in collaboration with SANCHIS-BAYARRI (V.), LÉPINE (P) & SCHOEN (R) Etude sur l'encéphalo-myélite provoquée par le *Toxoplasma cuniculi*. **Study of the Encephalomyelitis induced by *Toxoplasma cuniculi*** - *Ann Inst Pasteur*. 1929 June. Vol 43 No. 6 pp 673-735. With 48 text figs & 7 coloured figs on 1 double plate. 28 refs.

The authors refer to papers (see this *Bulletin*, Vol 25, pp. 719, 720) by TORRES, of Rio Janeiro, describing, by the name of *Encephalitozoon chagasi*, a new intracellular parasite infesting the brain and other tissues of a new-born infant suffering from congenital cerebro-spinal meningitis, by Levaditi, on an analogous case, reported by JANKU of Prague, of parasitic sporocysts found in the choroid and retina of a hydrocephalic and amaurotic infant, and by himself and SCHOEN, drawing attention to other recorded instances of protozoon parasites and cysts occurring in the brain. Here the authors refer also to other cases - one, reported by CASTELLANI, the other by FEDOROVITCH - which have some indirect bearing on the subject of the present paper, namely inflammations of the axial nervous system due to microsporidian parasites, and their bearing on Levaditi's theory of the microsporidian nature of the virus of rabies.

This paper describes a detailed experimental study of toxoplasmic encephalomyelitis, an acute (sometimes chronic) infection of the central nervous system with *Toxoplasma cuniculi*.

The stock of *Toxoplasma cuniculi* used in experiment was furnished by two rabbits which are described as "spontaneously infected" - the only two (of thousands whose axial nervous system has been

examined in the course of time) so distinguished in the authors' experience. These two rabbits had received intracerebral injections of brain-emulsion from animals that had been inoculated—inefficiently—with herpes, and the explanation suggested is that the site of the injection had been used as a port of call by *Toxoplasma* hailing from the spleen.

The fresh *Toxoplasma* virus thus obtained is increased in virulence by intracerebral passage through rabbits. Its infective power does not



Rabbit 691A. *Toxoplasma* cyst in cytoplasm of a neuron. $\times 900$



Rabbit 815A. Brain. Chronic toxoplasmic lesions. Large cyst containing *Toxoplasma*, surrounded by lymphocytes $\times 800$

[Reproduced from *Annales de l'Institut Pasteur*.⁷

last 48 hours, in glycerine on ice. Brain emulsions are not infective by the intracerebral route unless they are rich in *Toxoplasma*. Weak (diluted) emulsions, however, impart solid tissue immunity to subsequent dilutions of mortal strength.

Many pages are devoted to describing the receptivity of various species of animals to *Toxoplasma cuniculi*. The rabbit, guineapig, mouse, pigeon, chicken, and embryo chicken of 9 to 14 days (by inoculation into the egg) are all susceptible, particularly the rabbit, to which intracerebral infection is usually fatal in 6 to 12 days after

an exhibition of all the symptoms of an acute encephalitis complicated with myelitis. In the rat transcranial injection causes no symptoms, although the brain becomes infected with parasites. The dog, baboon, macacus, cercopithecus, and the adult fowl are refractory. The sites of infection and the routes by which it spreads are also discussed in detail. All the usual sites were tried, and the only one that proved to be not readily receptive was the intratesticular. The most favourable route both for penetration and further proliferation is the central nervous system; the optic and certain cranial nerves also serve for the spread of infection, but the peripheral nerves in general only serve for local proliferation, not for the spread of infection, and in this respect are unlike the neurotropic ectodermoses and neurovaccin. After proliferation in the brain the parasites may spread and multiply in spleen and liver and lung, even when they are not to be seen in the cerebrospinal fluid, blood, and kidney.

The pathological histology is described in particular detail. Briefly it is that of a nodular or diffuse parasitic inflammation spreading, in the perivascular tissue of the capillaries, through the brain, very intensely in the choroid plexus, and into certain cranial nerves. The *Toxoplasma* parasites are seen within the interstitial tissue cells, but rarely in the ganglionic cells, which, however, are much altered; they are well shown in the accompanying figures. The inflammatory processes in the choroid plexus may obstruct or obliterate the blood-vessels and so lead to dilatation of the lateral ventricles—indicating a tendency towards hydrocephalus.

Although the infection usually is quickly fatal, rabbits sometimes may survive more than 50, and mice more than 100 days. The changes in the brain and spinal medulla in these chronic cases are described, among them the *Toxoplasma* cysts resembling the cysts described by JANKU in the hydrocephalic and amaurotic infant.

A. A.

LEVADITI (C.) in collaboration with SANCHIS-BAYARRI (V.), LÉPINE (P.) & SCHOEN (R.). Etude sur l'encéphalo-myéélite provoquée par le *Toxoplasma cuniculi*. (Deuxième Mémoire.) [**A Study of the Encephalomyelitis provoked by *Toxoplasma cuniculi*. (2nd Memoir.)**—*Ann. Inst. Pasteur*. 1929. Sept. Vol. 43. No. 9. pp. 1063–1080. With 3 text figs. [8 refs.]

This paper treats of the mechanism of acquired immunity to infection with *Toxoplasma cuniculi*, and the tenour of its conclusions may be stated in a few words. Generally, if an animal (rabbit) have survived an ordinarily fatal inoculation of the living virus it is found to be refractory to several such subsequent inoculations. The acquisition of this immunity by inoculation of living virus has been confirmed by transcranial, intraocular, intradermic, and intravenous routes. Immunity to infection, however, is not imparted by the heated virus, nor by the specific serum, or even by an emulsion of dead virulent brain; and this last apparent paradox is explained by experiment showing that *Toxoplasmas* introduced into the living brain are there quickly and completely destroyed—that it is the living nerve-tissue that acquires immunity. In the authors' own phrase: In toxoplasmosis as in herpetic and neurovaccinal infections immunity is eminently

cellular. Each tissue-system defends itself by its own reactions to the virus which persist as long as the immunity lasts. "A state of latent cellular mobilization constitutes the defence on which the neuraxis stands fast each time that it finds itself in the presence of the virus against which it is solidly immunized." There follows a short account of artificial culture of the parasite; to the infected brain of a pigeon was added the embryo of a fowl and four boxes of Borrel, and an abundant culture followed from the third day, the cultures at 37° C. preserving their virulence for at least nine days. In an epilogue the authors emphasize the value of the study of *Toxoplasma encephalitis* in elucidating certain problems in neuropathology (e.g., the aetiology of hydrocephalus and other congenital forms of encephalitis) and the nature of the virus of rabies—quite apart from its explanation of the mechanism of the acquired immunity of the nervous axis as being exclusively a tissue-immunity eminently vital and independent of parasiticide properties of humours.

A. A.

LWOFF (Marguerite). Culture de *Leptomonas ctenocephali* Fantham var. *Chattoni* Laveran et Franchini, en milieux privés de sang frais: milieux liquides au sang chauffé. [**Cultivation of *Leptomonas* in Heated Blood Media.**]—*Bull. Soc. Path. Exot.* 1929. Apr. 10. Vol. 22. No. 4. pp. 247-252. [7 refs.]

Although fresh defibrinated blood is conducive it is not indispensable to the cultivation of *Leptomonas*; the organism can be cultivated indefinitely in peptonized media where the blood has been sterilized by heat.

A. A.

NITSCHKE (O.). Die pathologischen Veränderungen in der Milz bei Vogel malaria. [**The Pathological Changes in the Spleen in Bird-Malaria.**]—*Arch. f. Wiss. u. Prakt. Tierheilk.* 1929. Nov. 25. Vol. 60. No. 5. pp. 410-425. With 3 coloured text figs. [2 pages of refs.] [Path. Inst. of Vet. High School, Berlin.]

This well-documented dissertation on pathological changes observed in the spleen in acute bird malaria is based on a minute study of more than twenty infections. The macroscopic changes in the spleen are summarized, along with other relevant matters, in a table; the microscopic changes, which are described at great length, are summarized as follows.

At about eight days hyperplasia and active cell-division are observed in the lymphatic follicles of the spleen; as yet there is no deposit of pigment. In two to three weeks hyperplasia of the follicles has reached its height, and small streaks of pigment are seen in plenty in the fixed cells and large mononuclear leucocytes in the parenchyma. After the third week the lymphatic follicles shrink and the scene of activity shifts to the parenchyma where there is accumulation of fixed tissue cells and of free mononuclears and macrophages, and massive deposit of pigment in all these elements of the pulp. After the fourth week the tumidity of the spleen decreases with the onset of induration and pigment mostly takes the form of fine intracellular dust.

A. A.

ALBRECHT (Bruno). Zur Biologie des *Plasmodium praecox* Grassi und Feletti (Proteosoma). [**Biology of *Plasmodium praecox*.**]—*Arb. a.d. Staatsinst. f. Exp. Ther. u. d. Georg Speyer-Hause zu Frankfurt a.M.* 1928. No. 21. pp. 1-9. [11 refs.] [State Inst. for Exper. Therapy & Georg-Speyer House, Frankfurt a.M.]

These not very novel biological observations are published as incidental results of a two years' chemotherapeutic study of a strain of *Plasmodium praecox* (from the Robert Koch Institute) in canaries.

The normal incubation period was between 5 and 7 days, with a possible prolongation to 16 days. The attack lasted 14 to 18 days, the endogenous development of the parasites in the blood ceasing simultaneously in all stages. A few birds were cured after their infection had run its course, as was proved by transmission of blood and material from various organs (liver, spleen, bone-marrow, brain), but they were easily re-infected; in the great majority of birds the infection remained chronic with relapses in 2 to 3 per cent., or latent, and such birds were immune to re-infection with a homologous strain. Infection was transmitted to greenfinches, but other animals (dog, pigeon, sparrow, rat, and normal and desplenated white mice) were refractory.

A. A.

- i. KATAHIRA (J.). Beitrag zur Kenntnis ueber Vogel-malaria (*Proteosoma praecox*). [**Contributions to Knowledge of Bird-Malaria (*Proteosoma praecox*).**]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1929. Aug. No. 293. [In Japanese. German summary pp. 41-43. [Faculty of Med., Imperial Kyushu Univ., Fukuoka, Japan.]
- ii. —. Beiträge zur Kenntnis des *Proteosoma praecox*. [**Contributions to Knowledge of *Proteosoma praecox*.**]—*Zent. f. Bakt. I. Abt. Orig.* 1929. Nov. 30. Vol. 114. No. 7/8. pp. 502-509. With 12 graphs in text. [8 refs.] [Bact. Inst., Med. Faculty, Imperial Kyushu Univ., Fukuoka, Japan.]
- i. This paper deals chiefly with the chemotherapy of bird malaria. The author recognizes two local races of *Proteosoma praecox*—one from the Java sparrow (*Oryzivora*), the other from *Fringilla kawarahiwa minor*—which are stated to differ in their course, circumstances of transmission, and immunological aspects, and in their appetite for birds and their susceptibility to quinine. With regard to the experimental infection in the Java sparrow the following statements are made in the Summary. A single injection of quinine in the early stage of an infection is often provocative of a relapse. The therapeutic effect of quinine seems to be greater in the ripe schizont stage than in the growing merozoite stage. Intramuscular injection of quinine is less precise in its effect than oral and intracardial injection. A simultaneous injection of sodium carbonate considerably enhances the effect of quinine. Prolonged administration of quinine is not curative. After quinine treatment most parasites are found in the spleen. If quinine is given in the incubation stage [of a first inoculation] the infection is suppressed, the blood is not infectious, and a reinoculation is ineffective, so long as the quinine is continued, but if quinine is given at the time of a re-infection none of these consequences follow—the infection pursues

its course. Experiments with plasmoquin, optoquin, euquinin, methylene blue, stibnal, synomenin, neosalvarsan, etc., showed that quinine was surpassed only by plasmoquin.

Some particulars are given of the difference between the *Oryzivora* (Java sparrow) race and the *F. kawarahiwa* race of *Plasmodium praecox*. The latter, which is transmitted by *Culex pallens*, has a shorter incubation stage (6 to 7 days) and a shorter crisis (9 to 11 days), and is very sensitive to quinine; the former, which develops only to the ookinete stage in *Culex pallens*, has a longer incubation stage (9 to 11 days) and a longer crisis (15 to 16 days), and is little sensitive to quinine.

ii. This seems to be a German edition of the above paper. Here the experiments with quinine and plasmoquin are briefly defined and graphically represented, and the differences between the two races of *Proteosoma praecox* are minutely tabulated.

A. A.

TALIAFERRO (William H.) & TALIAFERRO (Lucy Graves). **Acquired Immunity in Avian Malaria. I. Immunity to Superinfection. II. The Absence of Protective Antibodies in Immunity to Superinfection.**—*Jl. Preventive Med.* 1929. May. Vol. 3. No. 3. pp. 197–208. With 1 text fig. [17 refs.]; pp. 209–223. [15 refs.] [Dept. of Hyg. & Bact., Univ., Chicago.]

The object of the experiments here reported in detail is to ascertain some of the factors underlying the acquired immunity of canaries to bird-malaria. (This acquired immunity, as the authors recount in historical detail, has been demonstrated by several observers, and has been proved to persist only during the continuance of a latent infection—i.e., to be only an immunity to superinfection, not an immunity to re-infection after cure). In the first paper the authors, working with a specified strain of *Plasmodium cathemerium* (= *praecox* or *relictum*), confirm the existence of this acquired immunity and its long persistence, in canaries harbouring a latent infection. They show that the parasites introduced (in washed blood cells) into such a resistant bird are removed at all stages of the non-sexual cycle and that the rapidity of removal is in direct relation to the number of parasites injected. Thus when the number of parasites injected is approximately 1 to 100 per 10,000 red cells they are removed from the peripheral blood within 24 hours, and when the number is increased to 100 to 400 per 10,000, within 48 to 70 hours. They show also that the degree of immunity to superinfection may be less at the beginning of the latent infection than later.

In the second paper the authors show that the serum of birds having this acquired immunity to superinfection has *in usu* neither protective nor curative property. Its inefficacy as a protective was demonstrated variously—when injected through the peritoneum either in admixture with parasites, or immediately after them; when injected intravenim the day after the parasites had been injected through the peritoneum; when injected simultaneously with the parasites and thereafter injected alone daily for four days; furthermore, its action could not be awakened by “passage,” and it did not sensitize the parasites *in vitro*. Its inefficacy as a curative is inferred from the fact that 0.1 cc. introduced daily for 5 days into one bird after parasites had shown in its blood “exhibited no curative action,” and that the rate of increase of the

parasites was "essentially similar" in 36 experiment birds that received varying doses of serum when parasites appeared in their blood, and in 18 control birds with typical infections.

The authors throughout define this immunity to superinfection as a parasitocidal "mechanism."

A. A.

SERGEANT (Edm.), DONATIEN (A.), PARROT (L.) & LESTOQUARD (F.). Sur l'existence de corps en grenade dans le cycle évolutif de *Gonderia mutans*. [**On the Occurrence of Plasma Bodies in the Life-Cycle of *Gonderia mutans*.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 542-544. [3 refs.] [Pasteur Inst. of Algeria, Algiers.]

The authors here verify the proof (by THEILER and GRAF) of BRUMPT'S hypothesis that the life-cycle of *Gonderia mutans* (Theiler) comprehends schizogony of the *corps en grenade* type characteristic of FRANÇA'S genus *Theileria*. They agree therefore with THEILER and GRAF that *Gonderia* of DU TORR is a synonym of *Theileria*.

A. A.

KUDO (R.). **Studies on Microsporidia Parasitic in Mosquitoes. VII. Notes on Microsporidia of some Indian Mosquitoes.**—*Arch. f. Protistenk.* 1929. Vol. 67. No. 1. pp. 1-10. With 61 figs. on 1 plate. [22 refs.]

From smears and from sections of preserved material the author describes and figures as new species *Thelohania indica* parasitic in the larva of *Anopheles hyrcanus* and *T. obscura* in the larva of *Anopheles funestus*. He also has illustrated notes on *T. legeri* which is parasitic in the larva of six Indian species of *Anopheles*. Furthermore, he gives lists of known Microsporidia parasitic in mosquito larvae and of their respective hosts. He states that heavily infected larvae die before pupation, but that a light infection is not fatal.

A. A.

MISSIROLI (A.). Sui microsporidi parassiti dell' *Anopheles maculipennis*. (**On the Parasitic Microsporidia of *Anopheles maculipennis*.**)—*Riv. di Malarologia.* 1929. July-Aug. Vol. 8. No. 4. pp. 393-400. With 25 figs. on 2 plates. [5 refs.] [English summary p. 479.]

The species of *Thelohania* described by HESSE and the 5 species described by KUDO as parasites of the larva of *Anopheles maculipennis* are mentioned, and the author here differentiates another species, *T. grassi*, that infests the eggs, and also hints at still another species very similar to the *T. legeri* of Hesse.

A. A.

MASING (Ernst). Ueber die Bedeutung des Magens für die Infektion mit *Balantidium coli*. [**On the Importance of the Stomach for Infection with *Balantidium coli*.**]—*Klin. Woch.* 1929. Dec. 17. Vol. 8. No. 51. pp. 2380-2382. [11 refs.] [1st & 2nd Med. Clinic, Dorpat, Estonia.]

Evidence is offered to justify the opinion that infestation by *Balantidium coli* is effected by way of the stomach. Tabulated details of 19 cases of balantidiasis observed during last year are given. Fourteen of the patients were over 50 years of age, and the youngest was 27; 18 had lived more or less in the country, 3 had tended pigs. In 9 cases

there was something suggestively wrong with the teeth ; in 12 cases the contents of the stomach were examined regularly and all were found deficient in HCl in greater or less degree, down to alkalinity in one case. A study of cases recorded by other observers disclosed several observations of absence of free HCl and of atrophic and other changes in the gastric mucosa. Despite the well-known fact that *Balantidium coli* is quickly killed in vitro by 0.01 per cent. solution of HCl the author has often seen it alive in faeces giving the acid reaction with litmus. He therefore thinks that it may survive passage through the stomach under abnormal conditions of gastric subacidity.

A. A.

DA CUNHA (Aristides Marques) & MUNIZ (Julio). Sur l'encystement du *Balantidium coli*. [**Encystment of *Balantidium coli*.**—C.R. Soc. Biol. 1929. July 17. Vol. 101. No. 24. pp. 944-946. [Oswaldo Cruz Inst., Rio de Janeiro.]

— & —. [In Portuguese & English.] Sobre o encystamento do *Balantidium coli* (nota preliminar). **On the Encystment of "*Balantidium coli*" (Preliminary Note).**—*Inst. Oswaldo Cruz, Suplemento das Memorias*. 1929. Jan. & Feb. No. 5. In Portuguese pp. 26-29. With 1 folding plate. In English pp. 30-33.

In studying *Balantidium coli* in *Macacus rhesus* the authors have twice observed the phenomena of encystment and excystment. It took place in large numbers of the ciliate at once, so that in a single preparation 20 to 30 cysts were seen. The process seemed to be accomplished in 24 hours. After a day or two, during which cysts greatly predominated, they disappeared and large numbers of peculiar vegetative individuals took their place—and are therefore inferred to be the issue of excystment.

In the process of encystment, as observed in fresh material, the *Balantidium* remained stationary, rotating violently. It became spherical, with a double contour. The striae of cilia and the peristome generally persisted, and the cytoplasm, which did not fill the cyst completely, became granular and full of inclusions, among them a large mass, or agglomeration of masses, which on treatment with lugol appeared to be glycogen or something similar. With gradual cessation of rotary movement encystment was complete. In stained preparations of this process cysts were seen in which the macronucleus had divided into two round nuclei and the micronucleus had disappeared—fused with the macronucleus. This binucleate form appears to be the ripe cyst ; but quadrinuclear forms were occasionally seen.

The peculiar forms next seen in fresh material were elongate and flat and had a clear hyaline cytoplasm, free of inclusions, and two round nuclei each including 3 or 4 little granules encircled with a halo ; in stained preparations these granules appeared as a single halo-circled mass—the beginnings of the micronucleus. These elongate hyaline forms are called metacystic.

Followed up, the metacystic form divides, and then divides again, so that its final issue is a family of four ordinary vegetative individuals.

A. A.

CICINNATI (Attilio) & DENES (Giulio). Balantidiosi umana e balantidiosi suina. [**Balantidiosis of Man and Pig.**—*Ann. di Med. Nav. e Colon.* 1929. July-Aug. Year 35. Vol. 2. No. 1-2. pp. 17-25. [Hyg. Inst., Univ., Padua.]

A comparison of *Balantidium* from a dysenteric case from Asia Minor with the ciliates from pigs in Padua lead the authors to the conclusion that the two are not identical. They describe differences in size, shape, position of cytostome and the arrangement and movement of the cilia.

C. M. Wenyon.

SWEENEY (Marion A.). **A Comparative Study of the Action of Certain Drugs and Chemicals on *Balantidium coli*, Malmsten, in the Guinea Pig.**—*Amer. J. Hyg.* 1929. May. Vol. 9. No. 3. pp. 544-559. [34 refs.] [George Williams Hooper Foundation for Med. Research, Univ. of California, San Francisco, California.]

The discovery that the guineapig naturally harbours plentifully a *Balantidium* which in structure and dimensions conforms with the *Balantidium* of man and pig has led the author to study the effects of various drugs (of more or less repute in parasitic intestinal infections of man) upon this guineapig infection. In these experiments "the arsenicals were found to be the most effective chemo-therapeutic agents. Of these, stovarsol, tryparsamide, and parosan gave highest balantidicidal action and lowest toxicity to the host." With them in suitable doses it was possible to destroy the parasites and cure the balantidiasis without poisoning the host; but in drawing inferences for practical usage, it must be remembered that the *Balantidium* of the guineapig does not injure the animal's intestine and appears to have no pernicious effect at all upon its natural host. Some compounds of silver (silver lactate and argyrol) had balantidicidal property in safe doses, and are considered worthy of further trial; but silver nitrate was impotent. Of other drugs tested, ipecacuanha powder had some balantidicidal effect; carbon tetrachloride in effective doses was generally toxic to the host; benzyl benzoate, yatren, emetine, and mercury salicylate and benzoate in effective doses were toxic to the host; and bismuth, thymol, and methylene-blue were useless. "The lack of correlation between *in vitro* and *in vivo* tests is again demonstrated."

A. A.

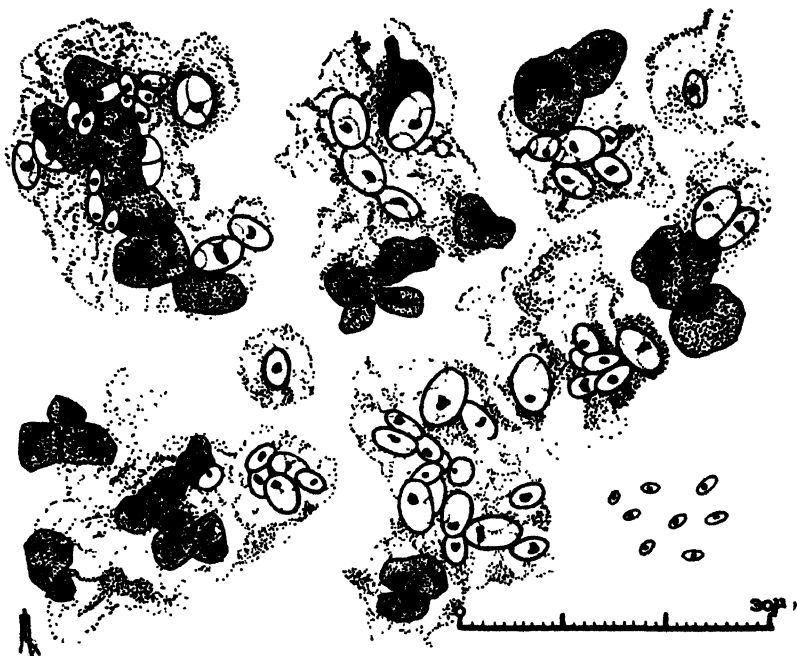
CURASSON (G.). *Troglodytella abressarti* infusoire pathogène du chimpanzé. [*T. abressarti*, a **Pathogenic Infusorian of the Chimpanzee.**—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 466-468. [1 ref.]

Some descriptive detail is here given of the Ophryoscolecoid Ciliate *Troglodytella abressarti* described in 1912 by BRUMPT and JOYEUX as a denizen of the intestine of the chimpanzee. The author states that in the south of the French Sudan it is common in chimpanzees, and although he allows that in nature it may be non-pathogenous, he is confident that in the captive anthropoid it causes a serious and even fatal diarrhoea—which, however, can be happily cured by yatren.

A. A.

COULON (G.). Présence d'un nouvel *Encephalitozoon* (*Encephalitozoon brumpti* n. sp.) dans le liquide céphalo-rachidien d'un sujet atteint de méningite suraigüe. [**A New Encephalitozoon in the C.S.F. in Meningitis.**—*Ann. Parasit. Humaine et Comparée*. 1929. Nov. 1. Vol. 7. No. 6. pp. 449-452. With 1 text fig. [5 refs.] [Antimalaria Lab., Porto Vecchio, & Parasit. Lab., Faculty of Med., Paris.]

The bodies here described and figured, which are said to resemble LEVADITI'S Encephalitozoon in all but size, were found in the cerebro-spinal fluid in a fulminating case of meningitis. The patient, a youth of 17 years, a Corsican villager, who had never left home except for the



Encephalitozoon brumpti, n. sp. All the parasitic forms found in the preparation are here represented. No budding forms resembling a yeast were observed. In the lower right hand corner of figure eight small bodies representing *Encephalitozoon cuniculi* are shown for comparison.

[Reproduced from *Annales de Parasitologie Humaine et Comparée*.]

annual summer migration to the hills, was suddenly prostrated by headache and fever. Next day vomiting supervened. The third morning he was comatose, with exaggerated symptoms of meningitis and an axillary temperature of 104° F., and also a considerable right exophthalmia with loss of ocular reflexes. The third night he died.

Lumbar puncture before death showed a fluid of normal tension and slightly opalescent, which on centrifugation disclosed, in clumps or isolated, a multitude of oval bodies, from $6 \times 4 \mu$ to $2 \times 1.25 \mu$ in diameter, having a central deep-staining mass of chromatin and a faint-staining protoplasm. These bodies are here named *Encephalitozoon brumpti*. No autopsy could be made.

A. A.

IMMS (A. D.). **Some Methods of Technique Applicable to Entomology.**—*Bull. Entom. Res.* 1929. Aug. Vol. 20. Pt. 2. pp. 165–171. [6 refs.] [Rothamsted Experimental Station, Harpenden.]

This paper gives some of the author's experience of methods of mounting, staining, and decolourizing microscopic preparations, of dissecting fluids, and of storage of material preserved in spirit, and also describes some improvisory methods of rearing insects. For mounting small and delicate objects he recommends DE FAURE'S fluid, which "has the advantage of killing, fixing, and mounting in a single operation, without the necessity of any previous or subsequent treatment," except (in the tropics) ringing the cover-glass; its composition is gum arabic 30 gm., chloral hydrate 50 gm., glycerine 20 cc., distilled water 50 cc., chlorhydrate of cocain 0.5 gm.; after mixing the ingredients, filter. By virtue of the cocain De Faure's fluid fixes whole organisms in an extended condition. Also "a few hours after mounting, an object, such as a Dipterous larva, will exhibit its tracheal system with remarkable clarity"—even to the finer branches. For Acarines, the medium extensively used by BERLESE, which also kills and fixes, so that living specimens can be placed on the slide and mounted in an extended condition in a single operation, is recommended. Berlese's fluid consists of distilled water 20 cc., chloral hydrate 160 gm., gum arabic 15 gm., glucose syrup 10 gm., acetic acid 5 gm. GILSON'S Euparal is a useful mounting medium, since objects, stained or unstained, can be mounted in it straight from alcohol without any clearing operation; it is obtainable from Flatters and Garnett, Ltd., 309, Oxford Road, Manchester, in two forms, green and colourless, of which the author prefers the colourless. For the examination of minute delicate objects in the living condition, where, in the author's experience, normal salt solution often ruptures or distorts the parts, Ringer's fluid is recommended.

A. A.

DUNN (Lawrence H.). **Notes on Some Insects and Other Arthropods affecting Man and Animals in Colombia.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 493–508.

An annotated list of noxious insects collected and observed occasionally in the course of 15 months' work on yellow-fever control in Colombia. The list includes 5 species of Anopheles, two of which are notorious malaria carriers; 36 other species of mosquitoes, including *Aedes aegypti*, *Culex 5-fasciatus* (= *fatigans*), and the *Psorophora lutzii* that distributes the eggs of *Dermatobia hominis*; a troublesome species of Simulium; 9 species of Tabanidae; the cosmopolitan stable-fly (Stomoxys), the screw-worm fly (Cochliomyia), and Dermatobia; 2 species of tick-flies (Hippoboscidae); the chigger, the dog-flea, and *Pulex irritans*; the ubiquitous head, body, and crab lice and bed-bug; a species of Conorhinus (Triatoma); *Argas persicus*, the two notorious S. American species of Ornithodoros, and 6 species of hard ticks.

A. A.

SHANNON (Raymond C.). **Entomological Investigations in Connection with Carrion's Disease.**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 78–111. With 6 text figs. & 2 plates. [43 refs.]

A full report of an expedition to Peru to collect blood-sucking Arthropoda for use in the Noguchi (Rockefeller) investigations of

verruca. The author begins with a historical review of the subject, from ARCE (1889), who first suggested the agency of a blood-sucking arthropod in the transmission of the disease, to NOGUCHI (1926), who transmitted *Bartonella bacilliformis* in monkey (Rhesus) experiments by means of ticks (*Dermatocentor andersoni*), and including a longish notice of the experiments of TOWNSEND (1912-1914) which implicated *Phlebotomus* and in particular *P. verrucarum* as the transmitter. The author's observations are confirmatory of TOWNSEND. There follows a systematic and descriptive account of the three species of *Phlebotomus* found in the verruga zone, a summary of the ecological evidence indicating *Phlebotomus* as the agent, and an interesting account of the conditions of existence—topographical, physiographical, seasonal, faunal—in the Rimac valley, in one region of which—the “verruca zone”—these conditions are exclusively favourable to *Phlebotomus*. The habitats, habits, and behaviour of the insect in this zone are described, along with some fine illustrations of the country and the author's personal experience of it. Opinions regarding natural reservoirs of the infection are discussed, but no original observations are offered. A list of about 66 species of arthropods of medical and veterinary interest collected, and a bibliography, conclude this admirable report.

A. A.

HECHT (Otto). Ueber Insektenstiche. [**Insect Bite.**]—*Dermat. Woch.* 1929. June 8 & 15. Vol. 88. Nos. 23 & 24. pp. 793-810; 839-848. [Numerous refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

This elaborate compilation is a study of the variable effects of the attack of common blood-sucking insects. It concentrates attention on the known effects of their bites upon the human skin and on the antecedents of these effects in the secretions injected in the process of sucking, and, since it is addressed mainly to dermatologists, morphology, physiology and all other aspects of entomology are purposely excluded. A valuable feature is the voluminous bibliography.

A. A.

LAMBORN (W. A.). **Medical Entomologist's Report.**—*Nyasaland Protectorate Ann. Med. Rep. on the Health & Sanitary Condition for Year ending 31st December, 1928.* Appendix I. pp. 35-38.

This concise and interesting report records the failure to stop the migration of tsetse-fly by simple clearing in the Dowa and Fort Manning Districts of Nyasaland. Notwithstanding the extension of the previous clearings (250 to 1,000 yards broad) to a total length of over 30 miles in the former and over 20 miles in the latter district, the fly has continued to advance, independent of any movement of game, and has been observed to be breeding. The advance was favoured by the coarse high grass, which—quickened by the natural fertility of a virgin soil and fertilized by the wood-ash from the combustion of the felled trees—soon extended from end to end of the clearings. It is now realized that to make clearings really effective against invasion of fly they must be broader (a minimum of 2 or 3 miles) and must be cultivated by a settled native population, and this is the scheme presently to be

introduced. The land is suitable for high grade tobacco, and it is hoped that European planters may take it up. Furthermore, the headman of each native colony will be armed with a rifle and a limited amount of ammunition to boom off trespassing game.

The reporter narrates his misfortunes—mostly of a kind unknown to workers in the palatial laboratories of the higher civilization—in pursuing an experimental inquiry into possibilities of a cyclical transmission of trypanosomes by Ixodine ticks. Despite vicissitudes, he is able to describe in concise but sufficient detail one complete series of experiments with *Rhipicephalus sanguineus*, the results of which are negative. Neither in larva nor in nymph stages did representatives of this species take infection, although in both cases large batches of clean home-bred individuals were allowed to feed to repletion on heavily infected animals, and in their subsequent stages were put to a test on healthy animals. The inquiry is in progress with other species of ticks.

The reporter gives confirmation of his earlier discovery of the gradual disappearance during the dry season at altitudes of about 3,000 feet and upwards (but not at the level of the lake = about 1,500 feet) of the common malaria-carrying anophelines of the country (*A. gambiae* and *A. funestus*)—a disappearance that lasts until the next wet season is well set. The other local species—*A. rhodesiensis*, *A. longipalpis*, and *A. pretoriensis*—have not been crimated with malaria, and *pretoriensis* is not even accused of persistent house-frequenting. In correlation with these observations, he has now found by blood examinations that in the children of the highlands (3000 + feet) the parasite-rate in the advanced dry season (October and November) fell almost to nil, but was followed by a conspicuous rise shortly after the onset of the rains (April and May). In respect of these seasonal differences in the parasite-rate, in highland children only, these observations are a confirmation of facts reported in 1925 and 1926. "These facts suggest a degree of resistance such as might well lead, in the absence of Anopheline vectors, to a reduction of gamete carriers to a point at which systematic treatment by drugs might be feasible." A suggestive addendum to the observations described above is that in a ravine where the presumably harmless anophelines (*i. rhodesiensis*, *A. longipalpis* and *A. pretoriensis*) that are persistent during the dry season breed five baboons were shot, of which three had a species of *Plasmodium* in their blood; this *Plasmodium* has been referred to Dr. J. G. THOMSON.

A. A.

CARTER (Henry F.). **Report of the Medical Entomologist for the Year 1928.**—Ceylon Administration Rep. of the Director of Med. & San. Services for 1928. 1929. Sept. Appendix 2. pp. C63-C66.

That part of this report which tells of research in the laboratory and practical work in the field comes under the heading of malaria infection and mosquito surveys. Of 1,627 *Anopheles* of seven species collected in huts and coolie-lines in various parts of the country for evidence of natural infection, 1,319 were *A. culicifacies*, which (along with *A. subpictus*) is the species of prevailing frequency inside dwellings. Of these 1,319 *culicifacies*, 69 were found infective, in 6 cases both in stomach-wall and salivary glands. So far, then, *A. culicifacies* is the only species known in Ceylon to be naturally infective, but, as is pointed out, examination of other species, particularly *A. listoni* and *maculatus*, is

deficient. The infected individuals were taken chiefly in December and January, but some also in February, March, August, September, and November. Mosquito (larva) surveys were accomplished at Diyatawala and Trincomalee, and at 13 railway stations; altogether 2,934 potential breeding-places were examined and 46,592 larvae identified, and the results were recorded and mapped. At Diyatawala *A. maculatus* (47 per cent.) was the prevalent species. At Trincomalee larvae were found in 43 per cent. of the 887 wells examined, *A. listoni* being predominant. Experiments with Paris green as a larvicide were unsatisfactory; the coir-dust used as a vehicle is too flocculent and the sprays used to distribute it are not powerful enough to deal with road dust.

A. A.

BEATTIE (Mary V. F.) & HOWLAND (Lucy J.). **The Bionomics of Some Tree-Hole Mosquitos.**—*Bull. Entom. Res.* 1929. May. Vol. 20. Pt. 1. pp. 45-58. With 6 text figs. & 3 figs. on 2 plates. [12 refs.]

This paper presents in concise yet assiduous detail the results of an attentive microcosmic survey—three rot-holes in three several trees among the celebrated Burnham beeches in Buckinghamshire. In the fauna of this little world—Rhizopods, Heliozoa, Ciliates, larvae of a Chironomid, of an Anthomyiid and of a Syrphid, a beetle, and a Nematode—the larvae of 3 mosquitoes—*Anopheles plumbeus*, *Finlaya geniculata*, *Orthopodomyia pulchripalpis*—were conspicuous, and attention is directed particularly to them. The *Anopheles* larvae were found throughout the year, most from September to December.

The water was rich in organic matter. No correlation was observed between its H ion concentration, dissolved oxygen, chlorides, solids, and ammonia-nitrogen and the incidence of larvae, but the total organic nitrogen was thought to be a determinative factor. The contents of the gut of 138 larvae were analysed and were found to consist, generally, of "small algae, a few animals, bacteria, and considerable quantities of rotting vegetation." The impression given was that the amount of algal and animal food was insufficient for nourishment and was probably supplemented by vegetable debris and perhaps by bacteria.

A. A.

DE BOISSEZON (P.). Expériences au sujet de la maturation des oeufs chez les culicides. [**Experiments on the Maturation of Culicid Eggs.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 683-689. [1 ref.]

The author has already recorded his observation that during the winter of 1928-29 mosquitoes (*Culex pipiens*) living in a warm cellar containing a puddle of water, but no food of any kind, produced eggs that gave issue to larvae. In the present paper he records in ample detail a series of experiments made in May and June to elucidate this remarkable phenomenon.

In one series of 3 experiments pupae of *Culex pipiens* were placed in a vessel of distilled water, within a cage. Adults of both sexes emerged in due course; were not fed; and died in a few days. In one experiment a small raft of ten eggs was left on the water, and these eggs hatched. The temperature was 16° C.-18° C.

In another series of 4 similar experiments the water used was from the puddle in the cellar where the original observations were made. In one of these experiments (temperature 20° C.-26° C.) a raft of 20 eggs was left.

In a third series of 3 experiments larvae from a stock fed on apples were caged in water containing in one case powdered yolk of egg, in another case shredded white of egg, and in another case powdered blood-clot. Pupation and emergence of adults followed; the adults were not fed, but all the females in these experiments produced rafts some of which contained 100 eggs and were as well formed as those of a female fed on blood. The temperature in these experiments rose to 26° C.

The author's generalizations are that it is possible for the female of *Culex pipiens* under rigorous starvation to produce eggs, the necessary energy for the maturation of the eggs coming entirely from the nourishment assimilated in her larval stage—particularly from a nourishment rich in proteins.

A. A.

MAC GREGOR (Malcolm E.). **The Significance of the pH in the Development of Mosquito Larvae.**—*Parasitology*. 1929. May. Vol. 21. Nos. 1 & 2. pp. 132-157. With 1 text fig. [42 refs.] [Wellcome Field Lab., Wisley, Surrey.]

This is a good paper and should be read by all who are interested in the subject.

The author summarizes the observations of the numerous workers who have criticized his suggestion that the healthy development of mosquito larvae is directly affected by the pH index of their watery home. His further observations and experiments, here reported, show, as he originally observed, that if under natural conditions the pH of a water be changed, the development of the larvae living in it is affected adversely—but that this, as he now discovers, is *not* so under bacteriologically sterile conditions. Consequently although the pH of the water may exercise no direct action on the larvae it may indicate the fitness or unfitness of the water as a chemical or biological medium—e.g., its fitness or unfitness to maintain a suitable plancton. This view of the usefulness of the pH index as an indication of the suitability of the water as a source of food is supported by the author's further investigation of the "suspended development" stage of many species of mosquito larvae. This stage, which in his experience has been observed only in the laboratory, can there be ended or induced by altering the pH, and is explained by him as a gradual or temporary starvation due to disappearance of certain microorganisms (which may also, as he states, be brought about by fall of temperature, and possibly by other agencies).

The author, who is master of a fine technique, also describes here a new method for highly successful cultivation of "*Aedes argenteus*" larvae and pupae under bacteriologically sterile conditions.

A. A.

SÉBENZOW (B. M.) & ADOWA (A. N.). La réaction actuelle du milieu dans l'écologie d'*Anopheles maculipennis* Mg. [**The Reaction of the Medium in the Ecology of *Anopheles maculipennis*.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 584-606. With 3 text figs. [8 refs.] [Trop. Inst., Moscow.]

During the last two years a series of papers by these and other associated authors has been noticed from time to time in this *Bulletin*, on the oecology of *Anopheles maculipennis*. By observation in nature they had noticed in the vicinity of Moscow that sedgy (*Carex*) marshes, with a high pH (6.6-7.8), a high O tension, and a rich plancton, are favourable for the larvae; while bogmoss (*Sphagnum*) marshes, with a low pH (3.7-5), a low O tension concurrent with a high percentage of organic matter, a high refractive index along with a low mineral content and a poor plancton, are unfavourable. On this observation the authors studied these two types of waters in the laboratory in very great detail, of which they have already published piecemeal results. The present comprehensive paper covers this same ground and brings us to the authors' conclusions. Again, by modifying the waters in various ways—by acidulation, by alkalization, by mineralization (enrichment with calcium) by decalcification, etc., and by comparison with distilled water they have sought out the one particular circumstance that determines the conditions of life for the larva of *Anopheles maculipennis*. In their conclusions they decide that the chemical reaction of the water is that determinative factor—for this species "a pH5 is the biological threshold below which the larvae perish in their first stage." It is enough to alkalize bogmoss water, notwithstanding all its imperfections, to make it highly favourable for larvae. As to how the chemistry of the water acts, they consider that it must be on the larval processes of nutrition, not upon the quantity and quality of food, not upon the plancton. They think, indeed, from their observation of the course of events in distilled water, that in nature there cannot exist any water so poor in plancton as to fall short of the requirements of mosquito larvae. The authors' conclusion of the whole matter is, for practical purposes, that success in antilarval measures against *Anopheles maculipennis* can be assured by reducing the pH of the water to 4—the limit of tolerance being 4.3.

A. A.

MATHESON (Robert) & HINMAN (E. H.). **Further Studies on *Chara* spp. and Other Aquatic Plants in Relation to Mosquito Breeding.**—*Amer. Jl. Trop. Med.* 1929. July. Vol. 9. No. 4. pp. 249-266. With 5 text figs. [10 refs.] [New York State College of Agric., Cornell Univ., Ithaca, New York.]

Continued studies both in nature and in the laboratory of the effect of *Chara fragilis* on mosquito breeding in the New York (U.S.A.) area. The conclusion of them all is that in clean water with *Chara* in vigorous growth mosquito breeding is inhibited, but that when the *Chara* begins to decay egg-laying and development of larvae proceed normally, unless the *Chara* recovers its vigour. A comparative study of the plancton of *Chara* water was started, with the rather surprising result that that of the *Chara* waters was found to be more abundant and more varied than those of the pool chosen for comparison and of the authors'

aquaria. [But since the chosen pool was a woodland pool, and only the bacteria seem to have been studied in the various experimental aquaria, this paradoxical result needs confirmation.]

A. A.

FEEGRADE (E. S.). **Experiments to note the Larvicidal Effects, if any, of Sodium Nitrate, Potassium Nitrate, and Magnesium Sulphate in Natural Waters.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 249–250. [Harcourt Butler Inst. of Public Health, Rangoon.]

In these experiments sodium nitrate added gradually to ordinary tank (=pond) water up to 30 gm. per 1,000 cc. of water had no effect on mature larvae of *Aedes aegypti* (=argenteus); potassium nitrate up to 25 gm. had no effect, but at 30 gm. was fatal in 48 hours; a combination of 10 gm. potassium nitrate and 8 gm. sodium nitrate was fatal in 48 hours; and a combination of 10 gm. potassium nitrate and 8 gm. magnesium sulphate was fatal in 17 hours.

A. A.

SERGEANT (Edm.), SERGEANT (Et.) & PARROT (L.). La destruction des moustiques par les poissons dans l'Afrique du Nord. [**Destruction of Mosquitoes by Fish in North Africa.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1929. Aug. Vol. 51. No. 8. pp. 590–602. With 11 text figs. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

The authors remind us of the qualifications necessary for fishes that are to be employed to hunt out and destroy Anopheles larvae hiding in shallow weedy waters; they must be small, agile, voracious and able to seize their prey either at the surface or below it, prolific, and adaptable to varied conditions of life. Such are the fishes of the cosmopolitan family Cyprinodontidae. In Northern Africa four indigenous species of this family are found useful for the destruction of Anopheles larvae—namely, *Cyprinodon iberus* and *C. fasciatus*, *Tellia apoda*, and *Phoxinellus chaignoni*, all of which are figured here. Also two very efficient American fishes have been acclimatized in Northern Africa, namely, the redoubtable Cyprinodont *Gambusia holbrooki*, and the perciform *Eupomotis gibbosus* which belongs to the Centrarchid family.

A. A.

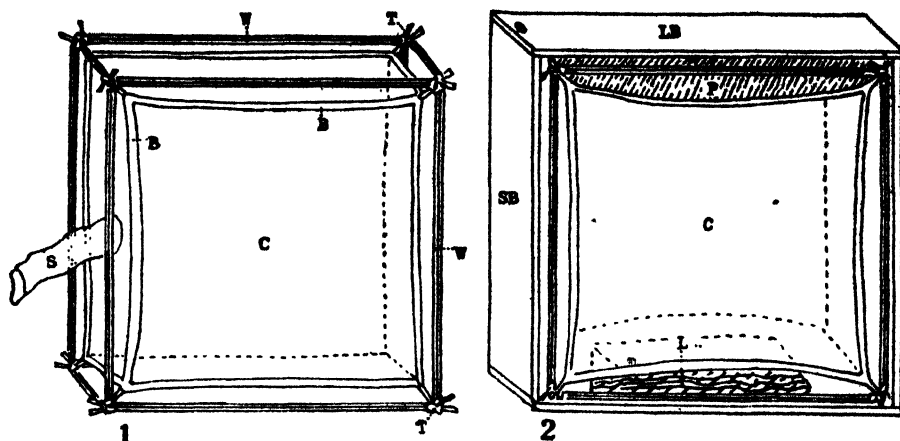
MACGREGOR (Malcolm E.) & LEE (Chung Un). **Preliminary Note on the Artificial Feeding of Mosquitoes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 203–204. [Wellcome Entom. Field Lab., Wisley, Surrey, & Peking Union Med. College, Peking.]

The authors confirm the fact that mosquitoes do not suck blood indiscriminately. In their observations *Anopheles maculipennis*, *Culex pipiens*, and *Aedes argenteus* could not be induced even under stress of starvation to feed on the birds offered. Citrated blood was then tried in vain, but when honey was mingled with it not only did the females but the males also feed on the mixture to repletion. The blood mixture was taken almost entirely into the diverticula, not into the stomach.

A. A.

BARRAUD (P. J.). A Simple Method for the Carriage of Living Mosquitoes over Long Distances in the Tropics.—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 281-285. With 2 text figs.

The gauze inclosure for the mosquitoes is tied inside its rigid framework (as a mosquito-net is tied to the frame carried by the bed-posts),



1. Wire frame and cage, showing method of securing latter inside former.
2. Method of packing cage in box (one side of box removed to show interior).

Lettering:—W, wires forming frame; T, tapes fastening wires of frame to one another and securing cage to frame; C, cage made of small mesh mosquito netting; S, sleeve; B, tape binding to edges of cage; P, cotton wool pad filling space between lid of box and top of cage, holding in place some raisins resting on mosquito netting; L.B, lid of box; S.B, side of box; L, pad of wet lint lying on bottom of box and sufficiently thick to press against mosquito netting forming bottom of cage.

[Reproduced from *Indian Journal of Medical Research*.]

and the whole is packed in a well-fitting box furnished at bottom with a pad of wet lint. Before the box is closed some suitable food is placed on top of the gauze inclosure. The method has been successfully tested in India for long distances and hot and dry seasons.

A. A.*

MARSHALL (J. F.) & STALEY (J.). The Graphical Representation of Instar Records in a Regional Mosquito Survey.—*Bull. Entom. Res.* 1929. Aug. Vol. 20. Pt. 2. pp. 195-198. With 2 figs. [British Mosquito Control Inst., Hayling Island.]

The paper illustrates a chart on which routine observations of mosquito larvae are plotted for six continuous months. The chart consists of seven columns, one of which contains, in file, the names of the individual species under observation, and the other six are headed each by the name of the month. Between the names of the species horizontal lines are continued across the seven columns, so that each species is provided with a train of compartments in which its appearances are plotted month by month. Thinner horizontal cross-lines divide every compartment into four spaces, in which each of the four instars of each species is separately plotted. At the foot of each column a space is

left for monthly record of rainfall. Tabular forms for notes of special interest on dates indicated by circles on the chart and for records of species-associations are also exemplified.

A. A.

FAUST (Ernest Carroll). **Mosquitoes in China and their Potential Relationship to Human Disease.**—*Jl. Trop. Med. & Hyg.* 1929. May 15. Vol. 32. No. 10. pp. 133-137. With 1 map in text. [16 refs.]

The author complains that China is still "one of the least worked, yet most fruitful, fields for investigation in faunistic parasitology," and again that "fifty years after Manson's epochal discovery the actual facts concerning mosquitoes in relation to human disease in China are indeed meagre." With regard to malaria "the entire problem of anopheline transmission in China is one in which only the most superficial beginning has been made." With regard to dengue fever we know something about the distribution of *Aedes aegypti*, but not whether any other *Aedes* species (e.g., *albopictus*) can transmit the disease, although there is good ground for the belief that some other species must do so north of Hongkong. And in respect of filariasis, although it has been proved recently that *Culex pipiens* is an intermediate host of the parasite in northern Kiangsu (just north of the range of *C. fatigans*), "very few attempts have been made to continue in the Far East the work initiated by Manson." The paper is illustrated by a good sketch map of China showing the southerly range of Palaearctic species of mosquitoes and the northerly range of Oriental species, and the intervening zone where *Anopheles hyrcanus* [= *sinensis*, a species common to both regions] is the predominant anopheline.

A. A.

PAINE (R. W.) & EDWARDS (F. W.). **Mosquitos from the Solomon Islands.**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 303-316. With 2 text figs. & 4 figs. on 2 plates.

Twenty-three species of mosquitoes are here listed from the Solomon Islands. The list includes *Aedes argenteus* (= *Stegomyia fasciata*), *Aē. variegatus*, *Aē. albolineatus*, *Culex fatigans*, and one *Anopheles*—*A. punctulatus*.

A. A.

MARSHALL (J. F.) & STALEY (J.). **A Newly Observed Reaction of Certain Species of Mosquitoes to the Bites of Larval Hydrachnids. Preliminary Contribution.**—*Parasitology.* 1929. May. Vol. 21. Nos. 1 & 2. pp. 158-160. With 3 text figs. [1 ref.] [British Mosquito Control Inst., Hayling Island.]

An illustrated description of "dark, serpentiform, tubular processes, originating at the points where the mouth-parts of the larval mites were attached to the host and penetrating within the abdomen to distances varying from 0.5 to 1.0 mm." The said processes, which remained in situ after the mites had been detached from the host, were found by the authors in a large number of female mosquitoes (chiefly *Aedes cinereus*) to which these mites were adherent. The said mites are larvae of a water-mite. The authors state that similar processes were figured by BRANDIS (1897) as present in the skin of a hedgehog attacked by harvest-mites (*Leptus*), and that that author apparently mistook them for the mouth-parts of the

mite. [The tubular processes are, no doubt, the deciduous stylostomes of the mites. For a good and well-illustrated account of the nature, formation and function of the stylostome see MARE ANDRÉ, *Bull. Mus. d'Hist. Nat.* Paris, 1927. Vol. 33. pp. 509-515.]

A. A.

KUMM (Henry W.). **The Geographical Distribution of the Malaria Carrying Mosquitoes. A Collection of Recorded Material in the Literature and in Personal Communications to the Author.**—*Amer. Jl. Hyg.* Monographic Series. 1929. Aug. No. 10. pp. iii+178. With 39 maps. [397 refs.]

A summary, compiled from published records, of the geographical distribution of the species of *Anopheles* known to be carriers of malaria parasites. Two species which "rarely, if ever, transmit malaria" are included, and 16 species "which have at one time or another been suggested as possible malaria vectors" or do not "seem to be of major importance" are excluded. The 34 species included in the summary are arranged in alphabetical order, and for each species the continents and countries and separate localities of its reported occurrence are stated (usually with the authority for the statement) and plotted on a map.

A. A.

SWELLENGREBEL (N. H.) & DOORNBOS (W. H.). **On the So-Called "Daily Turnover" of the Anopheline Population in Resting-Places and its Bearing on the Evaluation of the Anopheline Incidence to test the Effect of Antilarval Measures.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam*. 1929. Vol. 32. No. 5. pp. 669-678. With 2 figs. [13 refs.] [Inst. of Trop. Hyg., Amsterdam.]

This paper, which deals with anopheline counts (*A. maculipennis*) in North Holland made for determining the effects of anti-larva operations on the anopheline population within the area of operations by comparison with the anopheline population outside it, is too full of small detail to be abstracted. The conclusion of general interest is that mere daily counts do not furnish reliable data for estimating local anopheline density unless the nature of the resting-places (e.g., whether a stable affording an abundant food supply attractive to female visitors, or an open uninhabited outhouse) and the "physiological status" (sex and season) of the anopheline residents be observed in the routine. The authors appear to have been satisfied with the evidence from daily catches in open uninhabited shelters, with perhaps fortnightly catches in stables.

A. A.

LA FACE (Lidia). **Morfologia delle larve anofeliche e descrizione delle specie italiane. (Morphology of the Anopheline Larvae and Description of the Italian Species.)**—*Riv. di Malariologia*. 1929. Sept.-Oct. Vol. 8. No. 5. pp. 538-568. With 7 text figs. & 39 figs. on 12 plates. [23 refs.] [English summary p. 634.] [Experm. Station, Anti-Malaria Campaign, Rome.]

This paper reviews the general morphology of the anopheline larva, including the author's own observations chiefly on pilotaxy, and describes in detail the several stages of the larva of each Italian species—*maculipennis*, *pseudopictus*, *bifurcatus*, *superpictus*, and *algeriensis*—

and the differential characters of *elutus*. In the case of *algeriensis*, the description and figure of which are said to differ somewhat from those of SERGENT, the egg also is described.

. A. A.

BARBER (M. A.) & KOMP (W. H. W.). **Breeding Places of Anopheles in the Yazoo-Mississippi Delta.**—*Public Health Rep.* 1929. Oct. 11. Vol. 44. No. 41. pp. 2457-2462.

The incidence, in the breeding-places in a district in the Yazoo-Mississippi Delta, of *Anopheles quadrimaculatus*, *A. punctipennis*, and *A. crucians*, as observed month by month over a term of four years, is here tabulated and discussed. *A. quadrimaculatus*, which is by far the commonest species and is the chief malaria-carrier, adapts itself to breeding-places of various types and its larvae may be found in almost every month of the year. *A. punctipennis* is also common and considerably adaptive. *A. crucians* is comparatively rare.

The Delta of the definition is, of course, the broad alluvial (inhabited) delta plain, where the breeding-places are ancient river channels and "ox-bow lakes" (mortlakes), swamps, ponds and springs, as well as borrow-pits and artesian wells; some of them are shaded by timber and some are exposed to the sun.

The practical conclusion of the study is that antimosquito drainage is a too expensive proposal unless, perhaps, as coming within the scope of a large project for the reclamation of land.

A. A.

GATER (B. A. R.) & RAJAMONEY (P. D.). **A Summary of Records of Anopheline Breeding-Places in Malaya.**—*Bull. Inst. Med. Res. Federated Malay States.* 1929. No. 2. 33 pp.

This valuable publication, although it embodies the results of more than twenty thousand collections of anopheline larvae made, during a "considerable" term, in pools, drains, swamps, ponds, rice-fields, streams, seepages, wells, and other waters "miscellaneous" and "artificial," does not claim to be a complete survey of the anopheline breeding-places of Malaya. It is sufficiently wide and varied, however, to support certain generalizations, of which one of the most important is that "the majority of anopheline larvae are far more adaptable than is generally thought." For instance, *Anopheles maculatus*, whose larvae are supposed to prefer clean water, continued to breed and multiply in plantation drains that were gradually and deliberately fouled to the stinking point, and also in pits containing some decomposing cow dung. Of the 24 species studied only two—*A. asiaticus* and *A. watsoni*—were restricted to one particular habitat, namely, bamboos. At the other extreme larvae of *A. aconitus*, *hyrcanus*, *kochi*, *maculatus*, and *vagus* were found in all the breeding-places specified above, and *A. barbirostris*, *fuliginosus*, and *karwari* in all but one.

A. A.

SIMMONS (James S.). **Malaria on the Island of Corregidor, P.I. II. Report of a Survey for Anopheline Mosquitoes, made December, 1928.**—*Milit. Surgeon.* 1929. June. Vol. 64. No. 6. pp. 906-911. [3 refs.] [U.S. Army Med. Dept., Research Board, Bureau of Science, Manila, P.I.]

Corregidor, a small island of political importance in the Philippines, has generally been regarded as free from malaria; a report of 1925 stated

that no anophelines had been found there for two years. In 1928, however, malaria was found to be endemic among the natives, and some larvae of *Anopheles* were detected in a fresh filled watering trough. Since then five species of the genus—namely, *A. hyrcanus* (= *sinensis*), *A. karwari*, *A. ludlowii*, *A. minimus*, and *A. rossii*—have been discovered freely breeding chiefly in pools in ravines. Measures of control are in prospect.

A. A.

MANALANG (C.). **The Buccopharyngeal Armature of Philippine Anophelines.**—*Philippine Jl. Sci.* 1929. Apr. Vol. 38. No. 4. pp. 431-434. With 16 figs. on 4 plates. [2 refs.]

The author has examined the buccopharyngeal armature of the several Philippine species of *Anopheles* and finds agreement with the statements of BARRAUD and COVELL (see this *Bulletin*, Vol. 25, p. 814) respecting the same species in India—with the single exception of *A. ludlowii*. In this case he finds individuals that judged by the spotting of the legs would be varieties of *A. ludlowii*, and judged by the buccal armature would be varieties of *A. subpictus*. [A good animadversion on the "making of species" without profound meditation upon the first six chapters of DARWIN'S imperishable *Origin of Species*.]

A. A.

KADLETZ (N. A.) & KUSMINA (L. A.). Experimentelle Studien ueber den Saugprozess bei *Anopheles* mittels einer zwangsweisen Methode. [**A Method of Compulsory Feeding for Study of Suction in *Anopheles*.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. June. Vol. 33. No. 6. pp. 335-350. With 2 text figs. [28 refs.] [Lab. of Malaria Station, Samara, U.S.S.R.]

The authors recount and criticize the various methods in vogue for feeding mosquitoes in experimental observations and describe and explain the superior accuracy and other advantages of their own method. By this method a single insect is immobilized between a piece of paper and a glass slide, and is fed as required through a capillary tube into which the insect's proboscis is inserted. They say that the insect usually begins to suck whenever the tube is flooded, and that a single insect thus permanently fixed can be fed many hundreds of times and with any required variety of fluid, the process of suction being always under studied observation. The manipulations of this method must be followed from the original figures.

A. A.

SWELLENGREBEL (N. H.), DE BUCK (A.) & SCHOUTE (E.). **On Anophelism without Malaria around Amsterdam. (Third Communication.) On the Food of Adult *Anopheles maculipennis* in Malarious and Non-Malarious Regions.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1929. Vol. 32. No. 6. pp. 772-779. [7 refs.] [Inst. of Trop. Hyg., Amsterdam.]

The authors have made comparison between the malarious and the non-malarious districts around Amsterdam in respect of house-frequency of *Anopheles maculipennis*, stable-frequency, percentages of house-frequenting females full of blood, percentages of such females full of human blood, and average number *per house* of females containing

human blood (which last item they make the datum of "effective incidence" for malaria transmission). The comparisons have been made in early summer, in midsummer, and in autumn. The details and the tabulated statistics must be consulted in the original paper. The conclusion of the investigations is that "the strain of *Anopheles* in non-malarious regions [the long-winged paucidentate strain] is as likely to act as a vector during the malarial season as the one [the short winged pluridentate strain] prevalent in malarious areas."

A. A.

SWELLENGREBEL (N. H.). **On the Influence of the Wind in the Spread of *Anopheles maculipennis*.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 419-434. With 4 maps. [27 refs.] [Inst. of Trop. Hyg., Amsterdam.]

In a maritime tract in Holland, having sea on three sides, where *Anopheles* breeding was under control in a radius of 3 km. from a seaward centre, it became necessary to account for the presence of *Anopheles* that, there was good reason to believe, must be invaders from breeding-places further inland. Experiments with stained insects pointed to the influence of wind. The experiments are described and illustrated in detail, and the general conclusion from them is that "wind is of more importance in the dispersion of *A. maculipennis*, as a means of transport in the direction towards which the wind is blowing, than may be gathered from the current literature."

A. A.

GATER (B. A. R.) & RAJAMONEY (P. D.). **Notes on Handling *A. maculatus* Theo. for Experimental Purposes.**—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 88-91. [6 refs.]

In describing in much detail their own methods of preference no novel principles are disclosed, but emphasis is laid on the necessity of securing a constantly humid atmosphere for maintaining mosquitoes in long and healthy life, and for withholding food for some time before offering them an infective feed. References to other methods are appended.

A. A.

ANANIANE (S. A.). Sur la biologie d'*Anopheles pseudopictus* Grassi dans l'Ouezd d'Etchmiadzin en Arménie et sur la lutte conduite contre les moustiques hibernants. [**The Biology of *Anopheles pseudopictus* in Etchmiadzin in Armenia and on Methods of destroying Hibernating Mosquitoes.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 6. pp. 425-428. With 1 text fig. [In Russian. French summary p. 428.]

From the not very coherent or consistent summary it appears that in ten villages adjacent to Etchmiadzin (in Armenia, the predominant hibernating mosquito is *Anopheles maculipennis* (96 to 98 per cent.). The only other *Anopheles* hibernating in the imago stage is *A. superpictus* (0.5 to 2 per cent.). *A. pseudopictus*, very common in summer, has never been seen in winter, and therefore it is inferred that it must pass that season either in the larva stage, or as an imago in dry herbage beneath the snow. Nothing is said in the summary of the methods pursued in destroying hibernating mosquitoes.

A. A.

SOLOTNIKOW (I.). Beobachtungen über *Anopheles plumbeus* Hal. in Suchum. [**Observations on *Anopheles plumbeus* at Sukhum.**]—*Nachrichten der tropischen Medizin*. Tiflis. 1929. Sept. Vol. 2. No. 7. [In Georgian script. German summary p. 553.]

At Sukhum (in Transcaucasia) the author has observed larvae of *Anopheles plumbeus* in water in flower-pots, dung-pits, and cisterns, as well as in their native treeholes. The eggs of the wintering brood are to be found in October, and the resulting imagines appear in April, the larva stages being prolonged to four months and not being discomfited when the water is frozen over. Adults are never seen in winter. Even in summer the larva stages may be protracted when the water in their treeholes becomes thick and sour from evaporation.

A. A.

RUCHADSE (N.). Zur Biologie des *Anopheles Nigripes*. [**On the Biology of *Anopheles nigripes*.**]—*Nachrichten der Tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 5. pp. 336–344. With 5 text figs. [In Georgian script. German summary pp. 410–411.]

This paper deals with the breeding-places, behaviour, and associations of *Anopheles plumbeus* [= *nigripes*] in Sukhum in Transcaucasia. There its larvae have been found not only in holes in trees, but also among roots of trees in shallow pools of the river and in casual receptacles of many kinds for domestic use.

A. A.

FEEGRADE (E. S.). **A Note on the Anopheline Fauna of a Small Tank throughout the Year.**—*Indian Med. Gaz.* 1929. May. Vol. 64. No. 5. pp. 251–252.

Four species of *Anopheles*—*A. fuliginosus*, *A. hyrcanus* var. *nigerrimus*, *A. barbivostris*, and *A. vagus*—were found breeding in this Rangoon tank. The names of the four species of “prawns” stated to destroy the *Anopheles* larvae are names of freshwater fishes; the alternative statement, therefore, “that anopheline larvae were *not* destroyed” by prawns, may be taken as correct.

A. A.

DE MEILLON (B.). **Notes on Some Mosquitos found in South Africa—I.**—Reprinted from *South African Jl. of Sci.* 1928. Dec. Vol. 25. pp. 316–324. With 20 text figs. [6 refs.]

Besides some notes and figures distinguishing the larvae of *Anopheles lo. gipalpis* and *A. marshalli* and some minor observations on 3 species of *Culex*, particulars of breeding-places of anophelines occurring in Johannesburg and its vicinity are given—namely, *A. mauritianus*, *A. pretoriensis*, *A. cinereus*, and *A. squamosus*.

A. A.

COLLADO (Juan Gil). Anofelismo en el delta del Ebro. [**Anophelism in the Delta of the Ebro.**]—*Medicina Paises Cálidos*. Madrid. 1929. Sept. Vol. 2. No. 5. pp. 436–438.

Anopheles reach their maximum in July–August, the proportion to *Culex* being about 20 to 1. Their natural enemies are notably *Cyprinodon hispanicus*, *Placa minutissima* and *Notonectes glauca*. None was found infected among 200 dissected.

H. Harold Scott.

DE BUEN (Eliseo). Incompatibilidad de coexistencia entre larvas de anopheles y lemna. [**Anopheles Larvae and Duckweed Incompatible.**]—*Medicina Paises Calidos*. Madrid. 1929. May. Vol. 2. No. 3. pp. 265-269. With 1 text fig. [11 refs.] French summary pp. 269-270.

This brief summary states that duckweed (*Lemna*) generally grows in waters containing organic matter, and that waters in which it grows are suitable for *Culex* but not for *Anopheles* larvae.

A. A.

VIDALE (E.) & SEPULCRI (P.). Tropismi nell' ovoposizione degli anofelini. (**Tropisms in Egg-laying of Anopheles.**)—*Riv. di Malarologia*. 1929. Mar.-Apr. Vol. 8. No. 2. pp. 172-175. [English summary p. 235.]

According to the summary the authors have observed both positive and negative tropisms in the parturient *Anopheles maculipennis* and *elutus*, and a remarkable positive tropism to sodium chloride manifested by *elutus*.

A. A.

KHAN (Bhupendra Mohan). **Records of Anophelines from the Bengal Dooars.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. p. 496.

Fifteen species are listed, the author having confirmed the record and added another species—*Anopheles jeyporensis*.

A. A.

IYENGAR (M. O. T.). **Adult and Larval Stages of *Anopheles majidi*.**—*Indian J. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 1-10. With 12 figs. on 1 plate & 2 text figs. [5 refs.]

Very full descriptions, with micrographs of specific features.

A. A.

MORIN (Henry G. S.). Sur la présence de *A. (Myzomyia) karwari* en Cochinchine. [***Anopheles (Myzomyia) karwari* in Cochinchina.**]—*Bull. Soc. Path. Exot.* 1929. Apr. 10. Vol. 22. No. 4. pp. 253-255. [1 ref.] [Pasteur Inst., Saigon, Indochina.]

The occurrence of *Anopheles karwari* in Cochinchina is noted. The identity of its larva with that of *A. maculatus* is confirmed. Its debated pathogenous powers are discussed.

A. A.

EVANS (A. M.). **Notes on Certain Varieties of *Anopheles marshalli* Theobald.**—*Ann. Trop. Med. & Parasit.* 1929. Nov. 8. Vol. 23. No. 3. pp. 415-425. With 6 text figs. [9 refs.]

Structural features of larva, pupa, and adult male described and figured.

A. A.

SEPULCRI (Piero) & VIDALE (Enrico). Ibernamento dell'*Anopheles bifurcatus* in provincia di Venezia. (**Hibernation of "*Anopheles bifurcatus*" in Province of Venice.**)—*Riv. di Malarologia*. 1929. Sept.-Oct. Vol. 8. No. 5. pp. 585-589. With 2 text figs. [English summary p. 634.]

In the Venetian Province *A. bifurcatus* hibernates in the 3rd and 4th larva stages. The larva is remarkably tolerant of sudden alterations of temperature, and of asphyxia, and of prolonged shaking. The intestine was always found empty.

A. A.

- PURI (I. M.). **Description of the Male, Female, Egg and Larva of *Anopheles annandalei* var. *interruptus* nov. var., with Corrections for the Previous Descriptions of the Type Species.**—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 385–396. With 6 figs. on 1 plate. [10 refs.] [Central Research Inst., Kasauli.]

Anopheles annandalei is reviewed, and a new variety *interruptus* is described, this variety being represented not only in the N.E. Himalayas and Assam but also in Ceylon. From actual comparison of the respective larvae the author pronounces BRUG'S *Lophoscelomyia djajasanensis* from Java to be synonymous with *Anopheles annandalei*. The minute differences between the adults of *A. annandalei*, its variety *interruptus*, and LEICESTER'S *A. asiaticus* are tabulated.

A. A.

- PURI (I. M.). **A New Tree-Hole Breeding *Anopheles* from South India—*Anopheles sintoni* sp. nov. and a Revised Description of the Larva of *A. culiciformis* Cogill.**—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 397–405. With 13 figs. on 1 plate. [7 refs.] [Central Research Inst., Kasauli.]

Upon certain differences in the male genitalia and in the larva the author separates this new species from Cogill's *Anopheles culiciformis*, the adults of which resemble those of this new species "so closely as to be almost indistinguishable" from them.

A. A.

- BRIGHENTI (Dino). Contributo allo studio dell'*Anopheles sacharovi* Favr. (**Contribution to the Study of "*Anopheles sacharovi*" Favr.**)—*Riv. di Malariologia.* 1929. May–June. Vol. 8. No. 3. pp. 305–309. [7 refs.] [English summary p. 354.]

Breeding experiments have discovered the fact that "*Anopheles sacharovi*" is a seasonal form of *A. maculipennis*. In summer it can be recognized; in autumn and winter it resembles *maculipennis* and in winter disappears as a "species."

A. A.

- CHORINE (V.) & BARANOFF (N.). Sur deux champignons parasites d'*Anopheles maculipennis* Mg. [**Two Fungi, Parasites of *Anopheles maculipennis*, Mg.**]—*C.R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25 pp. 1025–1026.

The authors at Zagreb observed two kinds of Saprolegniaceous fungi naturally infecting the one *Anopheles*, the other *Simulium* larvae. Experimentally, both kinds were mortal to *Anopheles maculipennis* larvae.

A. A.

- LIMA (A. da Costa). Sobre um novo anopheles do Brasil. [**A New Brazilian Species of *Anopheles*.**]—*Brasil-Medico.* 1929. Sept. 14. Vol. 43. No. 37. pp. 1100–1101. With 1 text fig. [Oswaldo Cruz Inst., Rio de Janeiro.]

The author describes, with a figure, as a new species (*Anopheles minor*) a small mosquito having considerable resemblances to *A. maculipes* and *A. apicimaculata*.

A. A.

EDWARDS (F. W.). **A New Anopheles from the Central Sahara.**—*Arch. Inst. Pasteur d'Algérie*. 1929. Mar. Vol. 7. No. 1. pp. 82–87. With 3 text figs. [British Museum, Natural History, London.]

A new species, *Anopheles broussesi*, "generally resembling *A. hispaniola* and *A. multicolor*," but "very distinct from both"; breeding in small excavations of the bed of irrigation channels.

A. A.

HECHT (Otto). Die Hautreaktionen auf den Stich von *Anopheles maculipennis* (Diptera, Culicidae). [**The Reaction of the Skin to the Bite of *Anopheles maculipennis*.**]—Reprinted from *Anzeiger f. Schädlingskunde*. Vol. 5. No. 10. pp. 117–119. With 4 text figs. [Inst. for Ship & Trop. Diseases, Hamburg.]

A meticulous description of the extent and duration of the superficial appearances.

A. A.

DE BUEN (Eliseo). Estudio experimental de algunas substancias larvicidas antianofélicas. [**Experimental Study of Larvicides.**]—*Medicina Países Cálidos*. Madrid. 1929. Sept. & Nov. Vol. 2. Nos. 5 & 6. pp. 401–430; 508–540. With 19 figs. & 3 charts in text. [54 refs.] [Antimalarial Inst., Navalmoral de la Mata, Cáceres, Spain.]

This article must be consulted in the original by those interested. It is too long for abstraction in the space available. The author carried out experiments in the laboratory and in the field to test the action of measures such as liquid paraffin, Paris green and stoxal, petroleum and leron, and the use of natural enemies, on species of *Gambusia*. Much detail is given, but the results are in general uniformity with the findings of previous workers.

H. Harold Scott.

BLANC (Georges) & CAMINOPETROS (J.). Quelques mots sur le mode de conservation des Stégomyias en cage. [**Notes on the Care of *Stegomyia* in Captivity.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 440–444. With 2 text figs. [1 ref.] [Pasteur Inst., Athens.]

For treatment of *Stegomyia* in prolonged captivity the author uses the ordinary wooden cage with glass front and gauze sides and sleeve, which, in order to insure a moist atmosphere, is furnished with a pair of porous earthenware vases kept full of water and plugged with absorbent cottonwool. To maintain a warm atmosphere this cage is stood in a large black box, which opens on a still larger black box containing a small gas-stove having a chimney opening to the outside. Both the enveloping box and the warming-box are furnished with large vessels kept full of water. Under these conditions the insects live happily for 10 months, laying their eggs on the feet of the vases. But they do not retain any experimental infection that they may have received.

A. A.

ROUBAUD (E.) & COLAS-BELCOUR (J.). Action des diastases et des facteurs microbiens solubles sur l'éclosion des oeufs durables du moustique de la fièvre jaune. Recherches expérimentales. [Action of Ferments and Soluble Products of Microbes upon the Hatching of the Dormant Eggs of the Yellow Fever Mosquito.]—*Ann. Inst. Pasteur*. 1929. May. Vol. 43. No. 55. pp. 644–655. [4 refs.]

Roubaud (see this *Bulletin*, Vol. 25, pp. 810, 822) has distinguished two sorts of eggs yielded by the yellow fever mosquito, namely, "active eggs" that hatch quickly and spontaneously in any sort of water, and "persistent eggs" that need an incubatory stimulus. In the present paper he describes and tabulates experimental proof that the stimulus is not to be explained by osmotic differences nor by the presence of sterile organic solutions, but is readily evoked by the presence of various *active* ferments—yeast, pepsin, trypsin, papain.

A. A.

McKINLEY (Earl B.). **The Salivary Gland Poison of the *Aedes aegypti*.**—*Proc. Soc. Experim. Biol. & Med.* 1929. June. Vol. 26. No. 9. pp. 806–809. [6 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

The author has taken the salivary glands from more than 2,000 females of *Aedes aegypti* and has made several copious and potent extracts in physiological saline. Their virulence is not destroyed by freezing to -12°C . for 5 hours, or by boiling heat for 10 minutes. As YORKE and MACFIE observed, they are neither haemolytic nor coagulant. Some persons are highly and immediately susceptible to them when the injection is intradermal, though not when it is subcutaneous; others are entirely insusceptible; still others give a delayed reaction, 8 to 18 hours after injection. Though some persons—particularly dark-skinned—acquire immunity, others are still susceptible after 8 to 10 successive injections. Attempts to produce a tissue immunity in a given area of skin by repeated injections and to produce an immune serum by intravenous injection into rabbits have been futile.

A. A.

EKBLOM (Tore). **Some Observations on *Stegomyia fasciata* during a Visit to Greece in the Autumn of 1928.**—*Acta Med. Scandinavica*. 1929. Vol. 70. No. 5/6. pp. 505–518. With 6 text figs. [10 refs.] [State Bact. Inst., Stockholm.]

A summary of well-known facts, enlightened by the author's own observations in Greece during the epidemic of dengue in 1928. In a village in the Peloponnesus lying above the local limit of "*Stegomyia fasciata*" (900–1,000 metres) he did not find any case of dengue except in persons who had come up from infected places below.

A. A.

HUFF (Clay G.). **Ovulation Requirements of *Culex pipiens* Linn.**—Reprinted from *Biol. Bull.* 1929. May. Vol. 56. No. 5. pp. 347–350. [4 refs.] [Med. School, Harvard Univ., Boston.]

The author draws attention to the fallacy of the assumption that a suck of blood is an essential prelude to maternity for mosquitoes.

He has fed *Culex pipiens* on raisins and haemoglobin, on yolk of egg, on potato-juice, on carrot-juice, and on apple-juice, and in every case good eggs that hatched were the sequel. In one of his numerous observations a female produced about 50 eggs within 18 hours of her emergence and without having taken food of any kind; the larvae from these eggs pupated on the fifth day of their life.

A. A.

DE BOISSEZON (P.). Remarques sur les conditions de la reproduction chez *Culex pipiens* L. pendant la période hivernale. [**Notes on the Reproduction of *Culex pipiens* L. in Winter.**—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 549–553. [3 refs.]

The author, making his interesting observations and experiments in a large cellar containing the heating apparatus of a dispensary in Toulouse, in the course of the particularly severe winter of 1928–29, gives in ample and exact detail proof of the following statements. (The cellar, be it premised, was damp, dirty water of suspicious origin had collected in places on its floor, and it was kept beautifully warm by the fire-box and chimneys of the central heating apparatus.) Under such favourable conditions it was observed that *Culex pipiens* in winter can become active and will suck blood and lay eggs, and that the larvae issuing from such eggs develop normally to the adult stage. A feed of blood, however, is not indispensable, since fertilized females were able to mature ripe eggs on a mixture of human serum and apple-juice, or even on simple apple-juice. Finally, “under favourable temperature conditions, fertilization of *Culex pipiens* can take place during winter both in freedom and in captivity.”

A. A.

EDWARDS (F. W.). **Mosquito Notes.—VIII.**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 321–343. With 4 text figs.

This is descriptive entomology, and its contents are as follows: Brief diagnoses of new varieties of *Anopheles rufipes*, *A. theileri*, *A. gigas*, and *A. hyrcanus*; descriptions of new and little-known African species of *Aedes*, *Aedomyia*, and *Culex*, and of new species from Fiji; remarks on larvae and pupae of *Eretmopodites* and *Mimomyia*; and certain taxonomic questions.

A. A.

BOREL (E.) & LABERNADIE (V. G. F.). **A List of the Species of Mosquitoes collected in the French Settlements in India.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 495–496.

Separate lists of mosquitoes taken in houses or near cattle in Pondicherry, Karikal, Chandernagore, Mahé, and Yanaon.

A. A.

TAYLOR (Frank H.). **Notes on Australian Culicidae (Dipt.).**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 271–277. With 6 figs. on 1 plate. [2 refs.]

Pure entomology; 2 re-descriptions, and descriptions of 4 new species.

A. A.

BOREL (E.). Les moustiques de la Cochinchine et du Sud-Annam. [**The Mosquitoes of Cochinchina and of South Annam.**]—*Arch. Insts. Pasteur d'Indochine*. 1929. Apr. No. 9. pp. 23-80. With 26 plates. [3 refs.]

This instalment of Borel's descriptive and illustrated catalogue of the mosquitoes of Cochinchina and South Annam is occupied exclusively with the Anophelines, the descriptions including the larva and both sexes of the adult of each species and synonyms without references.

A. A.

WIGGLESWORTH (V. B.). **The Early Stages of Some West African Mosquitoes.**—*Bull. Entom. Res.* 1929. May. Vol. 20. Pt. 1. pp. 59-68. With 7 text figs.

Includes description and figures of the curious breathing-trumpets of the pupa of *Hodgesia sanguinis*, each of which is cleft almost to the base to form a pair of leaflets.

A. A.

PERYASSÚ (Antonio Gonçalves). Plantas como criadouros de larvas de mosquitos. [**Plants as Nurseries for Mosquito Larvae.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 279-282. With 6 figs. on plates.

This paper is little more than a catalogue of Brazilian mosquitoes and the trees with which they have been found associated.

H. Harold Scott.

LOUGHNAN (W. F. M.). **Phlebotomus Flies in Mauritius.**—*Jl. Roy. Army Med. Corps*. 1929. Sept. Vol. 53. No. 3. pp. 202-205. [4 refs.]

The author makes known the discovery of *Phlebotomus* in Mauritius. The species is authentically identified as *P. africanus*. The first individuals were detected after a search of more than a year in December, 1928, and the number continued to increase from that time until April 1929. The flies were found in the usual places in and about buildings but a few were caught in débris among the descending roots of banyan trees.

A. A.

DYAR (Harrison G.). **The Present Knowledge of the American Species of *Phlebotomus Rondani* (Diptera, Psychodidae).**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 112-124. With 4 figs.

A critical descriptive catalogue of the presently-known American species of the genus *Phlebotomus* of Rondani, along with a tabular synopsis of distinctive specific characters.

A. A.

SERGEANT (Et.) & PARROT (L.). Sur l'existence de *Phlebotomus papatasi* (Scop.) et de *Phlebotomus minutus* Rondani, en rase campagne. [**Occurrence of *Phlebotomus papatasi* Scop. and *P. minutus* Rondani in Open Country.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. p. 544. [Pasteur Inst. of Algeria, Algiers.]

The authors, in June, in the hills of Western Biskra, found *Phlebotomus papatasi* and *P. minutus* in the burrows of desert rodents and in galleries of the bee-eater (*Merops*) at least $3\frac{1}{2}$ miles distant from the nearest abode of man. Only adults were observed.

A. A.

PERFILIEV (P. P.). Sur les phlébotomes du Turkestan et sur *Phlebotomus sergenti* var. *alexandri* Sinton. [**On *Phlebotomus sergenti* var. *alexandri* Sinton and Other Species in Turkestan.**].—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 545–549. With 7 text figs. [3 refs.]

The author describes and figures *Phlebotomus sergenti* var. *alexandri* Sinton, which, along with *P. sergenti* Parrot, *P. major* var. *longiductus* Parrot, *P. papatasi* Scopoli and a species of the *P. minutus* alliance, he has collected in Turkestan.

A. A.

BOGOIAWLENSKI (N.). Quelques observations sur la biologie de phlébotomes à Kazakh. [**Some Observations on the Biology of *Phlebotomus* at Kazakh (Azerbaijan).**].—*Arch. Inst. Microbiol. et Hyg. d'Azerbaïdjan.* 1929. Vol. 1. No. 1–2. pp. 126–135. [In Russian. French summary p. 156.]

ACHUNDOF (I.). Die Phlebotomusfauna einiger Gegenden von Azerbaïdjan. [**Species of *Phlebotomus* in the Republic of Azerbaijan.**].—*Ibid.* pp. 136–137. [In Russian. German summary p. 156.]

The species of *Phlebotomus* observed in Azerbaijan are *P. perniciosus*, *P. sergenti*, and *P. papatasi*, the first being the commonest and the last being the least abundant. [The scanty biological observations may be of local interest.]

A. A.

LEGENDRE (J.). La zoophilie des phlébotomes en Saintonge. [**Zoophily of *Phlebotomus* in Saintonge.**].—*Bull. Acad. Méd.* 1929. Oct. 29. Year 93. 3rd Ser. Vol. 102. No. 34. pp. 238–240. [2 refs.]

The author dilates on the occurrence of *Phlebotomus* in Rochelle, Pons and other places in the Departments of Charente where the species has been identified with *P. perniciosus*. He finds that in Pons, where it is now much more abundant than it was when he first noticed it in 1923, it is attracted to fowl-houses.

A. A.

NITZULESCU (Virgil). Contribution à l'étude des phlébotomes de Roumanie. [**Phlebotomi of Romania.**].—*Ann. Parasit. Humaine et Comparée.* 1929. Sept. 1. Vol. 7. No. 5. pp. 430–437. With 5 text figs. [11 refs.] [Parasit. Lab., Faculty of Med., Bucharest.]

A prolix description, with a photograph reproduction, of a specimen of a *Phlebotomus*—*P. major* var. *longiductus* by designation—from Bucharest.

A. A.

NITZULESCU (Virgil). Sur quelques phlébotomes de Yougoslavie. [**Phlebotomi of Yugo-Slavia.**].—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 494–505. With 5 text figs. [8 refs.] [Parasit. Lab., Faculty of Med., Bucharest.]

A purely entomological paper. According to the author, the *Phlebotomus major* var. *longiductus* of Parrot is identical with Newstead's *P. chinensis*.

A. A.

FREW (J. G. H.). **Report on the Tsetse Fly Survey of Sierra Leone. September 1927–February 1929.**—16 pp. 1929. Freetown: Government Printing Office.

This survey deals with the specific distribution of the tsetse-flies in Sierra Leone. It does not go beyond the adult flies and their

attitude towards cattle, and though it is observant and discerning, and would be instructive to the prospective grazier, it contains little of medical interest that is not well known.

A. A.

CHORLEY (J. K.). **Experiments in Grass Fires against *Glossina morsitans* in Southern Rhodesia.**—*Bull. Entom. Res.* 1929. Dec. Vol. 20. Pt. 4. pp. 377–390. [4 refs.]

The operations here described were started in the month of September, when most of the grass is thoroughly dry and burns well and the increase of fly is most active. The area selected was a fairly well watered tract at an altitude of 3,500 to 3,800 feet, a mixed *Brachystegia berlinia* bush well-stocked with game. It is not thought that the fire actually killed many adult flies; rather, it concentrated them along shady watercourses and in other parts where the fire was not fierce enough to destroy shade. Nor was any immediate effect noticeable on the puparia; more dead puparia were found after the fire, but this was thought to be attributable to the sun. Some concurrent observations showed that the maximum pupal term, 82 days, was for puparia collected in June (mean temperature 56° F.), and the minimum, 21 days, was for puparia collected in November (mean temperature 78° F.); that the parasites *Thyridanthrax*, *Syntomosphyrum glossinae* and *Stomatoceras exaratum* were present; that on an average 11 per cent. of the flies were infected with trypanosomes of the *congolense* and *vivax* groups (one specimen with *T. brucei*); and that the food of 905 flies dissected was recognizable mammal blood in 100 cases and bird blood in one case.

A. A.

CHORLEY (J. K.). **The Bionomics of *Glossina morsitans* in the Umniati Fly Belt, Southern Rhodesia, 1922–23.**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 279–301. With 5 text figs. [10 refs.]

The observations here discussed were made in 1923, partly in the very wet months February and March, but mainly in the dry months June to November. The fly-belt explored is about 1,500 square miles in extent and lies below the 3,000 feet contour. It is stated to have been extending, with increase of game, although it has been open to shooting since 1905. Breeding of *Glossina morsitans* is said to go on here all the year round, but most in September, and in all types of forest except the heavy evergreen jungle beside the river. Heavy thorn thickets and overgrown dongas are avoided, except in the dry season, when they are almost leafless. Most puparia were collected in open mopane forest when in full leaf. From 18,496 apparently alive puparia 2,304 parasites were collected—2 species of *Mutilla*, 5 species of Chalcidoids including *Syntomosphyrum*, and 1 or 2 species of the Bombyliid fly *Thyridanthrax*. In a table showing the weekly numbers of emergences observed in the laboratory between June 14th and November 25th, from a total of 9,223 puparia there emerged 7,440 *Glossinae* and—chiefly in the 3 months September–November—of *Mutilla glossinae* 1,151, of *Thyridanthrax* 588, of *Syntomosphyrum glossinae* only 33, and of all the Chalcidoids merely 11. In the week ending October 20th, 42·7 per cent. of all the emergences from the

puparia in the laboratory were *Mutilla glossinae*; and in the week ending November 10th, 64.2 per cent. were Thyridanthrax. The *Mutilla* does not appear to be difficult to breed for use, but all attempts to breed the Thyridanthrax in the laboratory have failed, since when confined in small jars these flies beat their wings to pieces and die in 24 hours. The Syntomosporum is extremely easy to rear, on Sarcophagid pupae, but it cannot stand sun and cannot burrow more than 1 to $\frac{1}{4}$ of an inch, and therefore its value is limited. For other detail on the life-history and behaviour of these parasites the original paper should be consulted. The percentage of collected puparia that failed to produce either flies or parasites increased from 23 per cent. in March to 60 per cent. in November. Experiments showed that half an hour exposure to the sun (118° F.) was sufficient to kill puparia even when covered by about an inch of sand.

A. A.

LESNE (Pierre). Sur la distribution des Glossines dans la région du Zambèze de Chemba (Afrique orientale portugaise). [**Distribution of Glossina in the Chemba-Zambezi Region of Portuguese East Africa.**].—*C.R. Acad. Sci.* 1929. Dec. 30. Vol. 189. No. 27. pp. 1313-1314. With 1 text fig.

In a survey carried out at the end of the wet and beginning of the dry seasons in the Zambezi basin of that part of Portuguese East Africa which is enclosed between Nyasaland, North-East Rhodesia, and Mashonaland the author has mapped the distribution of the local tsetse-flies. Large areas there are inhabited by *Glossina morsitans*, *G. pallidipes* is abundant in Pompoué and some other places, and *G. austeni* is now for the first time observed to be sporadic.

A. A.

AUSTEN (E. E.). **A New Tsetse-Fly of the *Glossina palpalis* Group occurring in Belgian Congo.**—*Bull. Entom. Res.* 1929. May. Vol. 20. Pt. 1. pp. 1-4. With 5 text figs.

The new species, *Glossina newsteadi*, here carefully differentiated and admirably figured in all its characteristic features, comes from the Belgian Congo and belongs to the *palpalis* group. In that group it is nearly allied to *G. pallicera* and has a close superficial resemblance to *G. caliginea*. From the latter it is distinguished by having, like *pallicera*, a broad fringe of fine setae along the anterior border of the third antennal segment; from the former by having the third antennal segment darker in its distal moiety and much less broadly fringed along the front border, and (in the male) by the much broader superior claspers and the more extensive distal narrowing of the inferior claspers. It is here represented by 6 females and 3 males from three localities in the Lower Lomami region.

A. A.

WIGGLESWORTH (V. B.). **Digestion in the Tsetse-Fly: a Study of Structure and Function.**—*Parasitology*. 1929. Sept. Vol. 21. No. 3. pp. 288-321. With 7 figs. on 1 plate & 16 text figs. [39 refs.] [School of Hyg. & Trop. Med., London.]

This is an intent study mainly of the histology and the digestive ferments of the midgut of the tsetse-fly, and a discussion of the results.

Histologically, three regions are recognizable: an anterior region or segment, about half the total length, lined with irregularly columnar epithelium except near the middle where there is a zone of giant-cells which are packed with the "bacteroids" generally regarded as symbiotic organisms; a middle segment of large massed deep-staining cells; and a posterior segment of regularly columnar epithelium. The anatomy and histology of the three segments are described in detail, as observed in the fasting fly and as observed some hours after a feed. In the anterior segment the blood is merely concentrated by loss of fluid; no digestive ferments are found there with certainty; and, contrary to ROUBAUD's doctrines, which are very adversely criticized both in their supposed facts and in their inferences, the present author finds no evidence that the "bacteroids" play any part in the digestion of the blood—though he speculates on the possibility of their usefulness in supplying some accessory food substance of the nature of vitamins. In the posterior segment the cells become much vacuolated in the later stages of digestion, indicative of absorption. It is in the middle segment that active digestion occurs. The author describes the changes in the ingested blood, the changes and disruptions in the epithelium, the digestive ferments detected and their strongly proteolytic character in contrast with those of *Calliphora*, etc. In this segment he has discovered—owing to the fact that they become injected with the ingested blood—an "amazing tangle," obviously not a true network, of tracheal capillaries breaking up in the cytoplasm of the epithelial cells. He finds that they can be made out, with difficulty, in the fasting fly, and also in *Calliphora*; recognizes their similitude to the tracheal capillaries of the rectal papillae; and discusses the observations of those who have thought that the tracheal system of insects may carry food as well as air.

Furthermore, the structure of the proventriculus and the origin and composition of the peritrophic membrane are very fully considered in comparison with observations of other writers, and the author confirms the statement that the peritrophic membrane, which he states is secreted afresh in whole or part at each meal, is composed mainly of chitin.

With the doubtful exception of lipase no enzymes were detected either in the proventriculus or in the salivary glands.

A. A.

AUSTEN (E. E.). **The Tsetse-Fly Parasites belonging to the Genus *Thyridanthrax* (Diptera.—Family Bombyliidae), with Descriptions of New Species.**—*Bull. Entom. Res.* 1929. Aug. Vol. 20. Pt. 2. pp. 151-164. With 10 text figs. [6 refs.]

"The only Dipterous parasites of tsetse-flies at present known belong to the family Bombyliidae, and to the genus *Thyridanthrax*, O. SACK., as enlarged by the late Professor BEZZI. Hitherto the species of this genus definitely stated in literature to be parasitic in the larval stage in *Glossina* pupae consisted solely of *Th. (Villa) lloydi* Austen, and *Th. (Anthrax) abruptus* Lw." In this paper the number of such species is raised to seven, of which three are described as new, the other four being critically reviewed, and the differential characters of all seven being conveniently contrasted in a key. "With one exception (*Th. argentifrons*, sp. n.), in which the holotype emerged from a pupa of *Glossina tachinoides* WESTW., while a paratype was bred from a pupa of *G. morsitans* WESTW. form *submorsitans* NEWST., these flies are not known to attack any species of

Glossina other than *G. morsitans*." Six out of the seven species occur either in Rhodesia or countries to the north-east or south-east; the seventh (*Th. argentifrons*) was met with in N. Nigeria.

A. A.

DINULESCU (G.). Description de la larve au premier stade du *Gastrophilus inermis* Brauer. La myiase gastrophilienne des joues chez le cheval. [**The First-Stage Larva of *Gastrophilus inermis* Brauer: *Gastrophilus Myiasis of the Cheek in the Horse.***]—*Ann. Parasit. Humaine et Comparée*. 1929. Sept. 1. Vol. 7. No. 5. pp. 419-429. With 7 text figs. & 3 folding plates. [10 refs.] [Parasit. Lab., Faculty of Med., Paris.]

A description very liberally illustrated of the egg and first-stage larva of *Gastrophilus inermis*. The eggs are attached to the hairs of the horse's face, and the new-hatched larva bores through the chaps into the mucous membrane of the horse's mouth, where it remains until the first moult.

A. A.

DINULESCU (G.). Sur la ponte du *Gastrophilus pecorum*. [**The Parturition of *Gastrophilus pecorum*.**]—*Ann. Parasit. Humaine et Comparée*. 1929. July 1. Vol. 7. No. 4. pp. 287-289. With 2 text figs. [2 refs.] [Parasit. Lab., Faculty of Vet. Med., Bucharest, & Faculty of Med., Paris.]

Hitherto the manner of disposal of its eggs by *Gastrophilus pecorum* has been a mystery, although HOBMEYER from the colour of the eggs inferred that they were laid on the ground. In Roumania after much search the author could not find any in nature, but in the laboratory he found them adhering to nymphs of its own species in breeding cages. He therefore concludes that *G. pecorum* in nature lays its eggs on objects of any sort in the vicinity of animals.

A. A.

MARTINS (Agrippino). Berne ocular, myiase nasal. [**Ocular and Nasal Myiasis.**]—*Brasil-Medico*. 1929. June 29. Vol. 43. No. 26. pp. 730-732.

In San Paulo cases of larva of *Dermatobia cyaniventris* in the eyelids are not uncommon. The author mentions one in a child a year old where the larva penetrated the eyeball and destroyed the eye. Other larvae, of *Cochliomyia macellaria* ("*Lucilia hominivorax*"), often invade the nasal cavities and cause widespread destruction of tissue. The author finds local instillation of chloroform by syringe the best treatment for destroying the larvae; he has never had any accident, but he takes care to prevent the fluid entering the glottis.

H. Harold Scott.

HARRIS (Stevens T.). **Human Myiasis, Externa.**—*U.S. Veterans' Bureau Med. Bull.* 1929. June. Vol. 5. No. 6. pp. 412-416. [16 refs.]

The original matter here consists of brief summaries of 6 cases of myiasis—5 nasal and 1 aural—from hilly grazing country in Old Mexico. Two of the nasal cases were fatal, one by sheer malignancy, the other by the intercurrent pneumonia. In another case recovery was delayed by the supervention of erysipelas. The maleficent

maggots are referred indiscriminately to *Cochliomyia macellaria* and *Chrysomyia*[?] *viridula*. In the treatment the following applications, direct or by spray, were found useful: a dilution of chloroform in olive oil, a 2 per cent. solution of mercurochrome, a "fly-killer" consisting apparently of pyrethrum dissolved in petroleum.

A. A.

STRICKLAND (C.). **A Case of Myiasis of a Carious Tooth.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. p. 386. With 1 text fig.

In this case, described as unique, about a dozen maggots were extracted from a cavity in a carious upper molar tooth. The maggots are identified as *Chrysomyia bezziana*.

A. A.

RAO (G. R.). **Myiasis in Lepers.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 380–382.

Three cases of myiasis are here described; one, a nasal case, where the maggots were few and the only one that survived to the imago stage was identified as *Musca domestica*; another, where maggots identified as *Sarcophaga* were undermining leprosy ulcers on the hands and feet; and a third, in "a particularly lazy and filthy patient" full of sores harbouring maggots, a few of which, on breeding out, were identified as *Sarcophaga* although the majority were *Musca domestica*.

A. A.

PORTO (Gabriel). **Myiase nasal e abcesso da loja temporal.** [**Nasal Myiasis with Abscess in the Temporal Fossa.**]—*Brasil-Medico.* 1929. Aug. 3. Vol. 43. No. 31. p. 899.

Nasal myiasis is common enough in the author's circuit. In the present case the maggots, which were very numerous, destroyed the ethmoid and bared a part of the sphenoid bone before they were removed. A few days afterwards a swelling in the temporal region was observed, incision into which set free extremely foetid chocolate pus and was followed by violent haemorrhage. Somehow or other maggots must have got into the temporal fossa by an internal route.

A. A.

ISHIKAWA (S.). **A Case of Myiasis.**—*Jl. Oriental Med.* 1929. Oct. Vol. 11. No. 4. pp. 124–126. With 3 figs. on 1 plate.

This is a horrible case. The victim was a tuberculous American, age 49, whose way of life may be pictured from the statement that he drank from 1 to 2 litres ($1\frac{1}{2}$ to $3\frac{1}{2}$ pints) of "*pai-chu*, something like gin," every day. When brought to hospital, in Manchuria, in an appalling state, blowfly maggots (*Lucilia sericata*) "were attacking eyes, ears, nose, urinal tract, anus, and all the openings of the skin and the mucous membranes, and at the same time spreading all over the body." Though death was actually due to tuberculosis, it was much hastened in these loathsome circumstances.

A. A.

LAWSON (George B.). **Myiasis.**—*Southern Med. Jl.* 1929. Nov. Vol. 22. No. 11. pp. 1003–1004. [3 refs.]

The author describes a typical case of infestation by the bot-fly maggot, *Hypoderma lineata*, in a man who had been a farm-hand—the larva, which

in the course of 3 or 4 months made a simple spiral ascent right round the trunk from the abdomen to the neck and finally worked through the cheek, was identified by Dr. C. W. STILES.

A. A.

KING (H. H.), IYER (P. V. Seetharama), NATARAJAN (N.) & GEORGE (P. V.). **A Rat-Flea Survey of the Madras Presidency.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 297–334. With 4 maps.

Here are three reports forming some part of the preliminaries of a survey now in progress to determine the geographical distribution of the rat-fleas of the Madras Presidency for the purpose of distinguishing the epidemiological significance of particular species in respect of plague. They are full of detail furnishing data for a coming comprehensive summary.

1. A survey during September (the beginning of the usual plague season) of Hosur in the Salem District. Here, all the rats were the white and the brown-bellied varieties of *Mus rattus*, the latter being 75 per cent.; their fleas were *Xenopsylla brasiliensis* 63 per cent., *X. cheopis* 28 per cent., and *X. astia* 9 per cent., and the general rat-flea index was 13.6. In the houses *Pulex irritans* was abundant.

2. A survey during the usual plague season (about mid-October to about mid-January) of West Bellary District and Guntakal in Anantapur District. All rats both forms of *rattus*; their prevalent fleas *X. cheopis* and *X. astia*: *X. brasiliensis* in one town only. Total rat-flea index ranged, according to locality, between 4.2 and 11.4; *X. cheopis* index between 1.4 and 9.1, *X. astia* index between 0.02 and 7.2. An outbreak of plague was in progress in one town during this survey.

3. A survey (during the usual plague season) of Periakulam, Kambam Valley and Dindigul. Except in cotton-mills and certain insanitary villages rats were "very sparse," probably owing to methodical rat-catching in recent years. The rats were "all varieties except *M. norvegicus*"; their fleas were *X. cheopis*, *X. astia*, and *Echidnophaga gallinacea*. Total rat-flea index ranging between 5.07 and 8.18; *cheopis* index between 1.02 and 4.69; *astia* index between 2.3 and 4.87. In experiments here conducted (to estimate the preventive value of exposing merchandise to the sun) it was found that caged rats exposed (in cotton bags) to the sun's rays died in 3 hours, and their fleas in 4½ hours when the average temperature was 85° F. At an average temperature of 80° F. both the rats and the fleas could endure an all-day exposure.

A. A.

HIRST (L. Fabian) assisted by VADIVELU (K.). **The Rat-Flea Survey of Kandy.**—*Ceylon. Sessional Paper XIII.*—1929. May. 8 pp. With 1 map. 1929. Colombo.

Four species of rodents so far have been found about houses in Kandy, namely, the Ceylon variety of *Mus rattus*, the Ceylon mole-rat (*Gunomys gracilis*), the common Indian house mouse (*Mus dubius*), and the Malabar bandicoot. All are susceptible to plague, but the only important one is *Mus rattus*, and in the outbreak of plague in 1927–28, of all the 7,261 rodents trapped or otherwise destroyed in the course of five months 90.72 per cent were this species. It is essentially a domestic species in Kandy as in Colombo. Three species of fleas

have been found on the rats of Kandy, namely, *Xenopsylla cheopis*, *X. astia*, and a single specimen of a *Ceratophyllus*. In the course of a three-months' rat-flea survey 427 rats were searched and yielded 1,463 fleas, of which 1,018, or 69.6 per cent., were *X. cheopis*. As a point of technical interest it is recorded that of the rats accounted for by daily trapping 5,429 were caught in 829 breakback traps, and 1,449 in 102 Wonder wire traps, a rate per 100 traps that shows the latter almost exactly twice as effective as the former.

A. A.

TRAUT (I. I.). **Fleas and Other Ectoparasites and Cohabitants of Ground-Squirrels (*Citellus pygmaeus* Pall.) and Methods of their Eradication.**—*Materials contributing to determine the Fauna of the Lower Volga Region.* Saratov. 1929. Pt. 3. pp. 53-96. With 3 figs. [23 refs.] [In Russian. English summary pp. 97-102.]

This report summarizes the results of three years' observation and experiment, concentrated upon a hectare (2.47 acres) of ground honey-combed with "hundreds or thousands" of burrows of the ground-squirrel (*Citellus pygmaeus*), with the object of discovering methods of exterminating this dangerous rodent and its noxious fleas in those inhabited parts of Central Asia where plague is endemic. Naturally, the fleas were found in strength in the burrows that contained fairly recent nests, and were fewest in summer when the ground-squirrels live and disport in the open. Apart from fleas, the burrows have a considerable fauna (more than a hundred species) of their own. This fauna includes voles and *Lagomys* and also the weasel, which last, although it destroys plenty of squirrels, also, like the others, spreads the squirrel-flea. Among the other commensals, ants, crickets, flies, lice, millipedes, pseudo-scorpions, spiders, ticks and woodlice are mentioned. In 7 field-working months (April-November) more than 26,000 squirrel fleas were collected, of which 70 per cent. were *Neopsylla setosa*, 15 per cent. *Ctenophthalmus pollex*, 11 per cent. *Ceratophthalmus tesquorum*, and 4 per cent. *Frontopsylla semura*; (also fifteen chance specimens collectively representing *Amphipsylla rossica*, *Ctenophthalmus orientalis*, *Ophthalmopsylla volgensis*, and *Pulex irritans*). Extermination experiments included drowning the squirrels and their fleas by flooding the burrows, and introducing various volatile poisons into the burrows, with or without subsequent plugging of the entrance. The poisons used were chlorine gas, under pressure; chloropicrine, gas, and soaked into wadding; carbon bisulphide, soaked into wadding, or exploded; and calcium cyanide in powder. Of all these substances and methods CS₂, squirted into the burrow in a 15 gm. dose and then touched with a flame and the entrance plugged, was found to be "nearly 100 per cent. effective" for destroying fleas; while the least effective was chlorine.

A. A.

IGNATIEV (A. K.) & MOLODZOVA (P. F.). [Les puces des nids du spermophile (*Citellus pygmaeus*) dans la région de Tcherny Jar de l'arrondissement d'Astrakhan.] **The Fleas of the Spermophilus (*Citellus pygmaeus*) Nests in Chernii Jar, Astrakhan.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 2. pp. 158-159. [In Russian. French summary p. 225.]

From 566 nests of *Citellus pygmaeus* examined during three successive springs and autumns (1926-1928) in a district of Astrakhan the author

collected 13,541 fleas—*Neopsylla setosa* 66.6, *Ctenophthalmus pollex* 26.9, *Ceratophyllus tesquorum* 9.8, and *Frontopsylla semura* 1.7 per cent. The greatest number of fleas found in a single nest, 225, was in March; the least, 15, in August.

A. A.

SWELLENGREBEL (N. H.). **The Prevalence of *Xenopsylla astia* in the Netherlands Indies.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 1. pp. 151–152. [Roy. Colon. Inst., Amsterdam.]

This appears to be a personal matter. The author explains that he collected *Xenopsylla astia* in East Java in 1912 and has always since 1921 been impressed with the significance of the work of HIRST and CRAGG on this species, in the hope of enlisting the interest of his class on the subject of its distribution, only desisting last year because no practical results seemed to be forthcoming from India.

A. A.

HERTIG (Marshall) & HUANG (Tsefang F.). **A Rat-Flea Survey of Peking.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 521–525. [2 refs.] [Peking Union Med. College, Peking, China.]

This survey was pursued for a whole year and 6,286 rats were examined. The only rat-fleas found were *Xenopsylla cheopis*, 98 per cent., and *Ceratophyllus anisus*, 2 per cent. The average number of *Xenopsylla* per rat was 1.33 for the whole year, with a maximum of 3.10 in August and a minimum of 0.30 in February.

A. A.

WLISS (A.). Sur les puces ou aphaniptères (Siphonaptères) de la Tunisie et leurs rapports avec les hôtes qu'elles parasitent. [**Fleas of Tunis and their Hosts.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 379–382. [10 refs.]

A list of the species known.

A. A.

WEBSTER (W. J.). **The Anatomy of the Indian *Xenopsylla* Larvae.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 90–93. With 5 figs. on 1 plate. [3 refs.] [Haffkine Inst., Bombay.]

Some minor critical observations, and the statement that the classical description by BACOT and RIDEWOOD of the anatomy of *Xenopsylla cheopis* (*Parasitology*, Vol. 7, p. 157) applies equally well to *X. astia* and *X. brasiliensis*.

A. A.

MYERS (J. G.). **Facultative Blood-Sucking in Phytophagous Hemiptera.**—*Parasitology*. 1929. Nov. Vol. 21. No. 4. pp. 472–480. [27 refs.] [Imperial Bureau of Entomol., London.]

It is well known to naturalists that many kinds of bugs whose normal nourishment is sap of plants may casually "bite" a man. In this discourse the subject is introduced and to some extent reviewed; a classified list of phytophagous Hemiptera recorded as attacking vertebrates and other animals is given; the author describes his observations (and his own painful experiences) of the behaviour of a plant bug that sucked his blood for an hour, and speculates on the

circumstances that distract an individual bug from its natural food ; some alleged pathological effects of such bug-bites are mentioned ; and a list of references is appended.

A. A.

TALICE (R. V.). Parasitisme de *Triatoma rubrovaria* par un sporozoaire. [**A Sporozoon Parasite of *Triatoma rubrovaria*.**]—*Ann. Parasit. Humaine et Comparée*. 1929. July 1. Vol. 7. No. 4. pp. 257–261. With 1 text fig. [15 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Not far from the town of Uruguay, among the boulders of a rocky declivity—a barren spot inhospitable to large wild creatures and considerably distant from the haunts of man and domestic animals—the author came upon a company of twenty young and adolescent individuals of the Reduviid bug *Triatoma rubrovaria*, some of which had a stomach half-full of nucleated red blood, traceable to the little fork-tongue lizard, *Teius teju*, a local cohabitant of the rocks. In the dejections of the bugs, metacyclic forms of *Trypanosoma cruzi* were discovered (their identity being stamped by inoculation upon rats). Also in one individual nymph a cyst containing sporozoites of a haemogregarine was found in the intestinal wall. From the facts related the author thinks that *Teius teju* must be the vertebrate host of this haemogregarine.

A. A.

WIGGLESWORTH (V. B.). Observations on the “Furau” (*Cicindelidae*) of Northern Nigeria.—*Bull. Entom. Res.* 1929. Dec. Vol. 20. Pt. 4. pp. 403–406. With 1 text fig. [6 refs.] [School of Hyg. & Trop. Med., London.]

It is here shown that the West African story of the “Fura” (larva of a Tiger-beetle) biting the feet of persons who tread on its burrow, and thereby causing the inflammatory lesions known as “furau,” is of imagination all compact. The author shows by experiment that the bite has no hurtful effect upon the skin of monkey or of man, and that the digestive fluid which it spews over its prey is quite innocuous although it has strongly proteolytic properties. The natives, however, regard this grim-visaged hump-backed creature with terror.

A. A.

PAWLOWSKY (E. N.) & STEIN (A. K.). Experimentelle Untersuchung über die Wirkung der, eine eigenartige Dermatitis beim Menschen hervorrufenden, Milbe *Rhizoglyphus* (*sic*) *hyacinthi* (Fam. Tyroglyphidae). [**Dermatitis Experimentally Produced in Man by means of the Tyroglyphid Mite (*Rhizoglyphus hyacinthi*).**]—*Arch. f. Dermat. u. Syph.* 1929. Sept. 18. Vol. 158. No. 2. pp. 443–449. With 4 text figs. [Military Med. Acad., & State Inst. for Med. Science, Leningrad.]

The authors describe in minute and overflowing detail their experimental production of a superficial itchy dermatitis in man by means of the well-known destructive bulb-mite *Rhizoglyphus hyacinthi*, a species closely related to the cheese-mite family (Tyroglyphidae).

When the crushed mites from infested onions were rubbed into, or merely left in contact with, the human skin there very soon followed itching, reddening, and transient papulation. No actual cases are mentioned of itch naturally acquired; but the authors build on the fact that, in 1910, *Rhizoglyphus parasiticus* of Dalgetty was found in a skin eruption observed on Indian tea-plantations.

A. A.

METZLER. Gastro-entéropathie avec présence dans les selles d'un acarien de la sous-famille des Tyroglyphines. [**Gastro-Enteritis associated with Tyroglyphine Mites in the Stools.**]—*Bull. Méd. du Katanga*. 1929. Vol. 6. No. 2. pp. 64-65.

A case of colic and diarrhoea with nausea and intense pruritus ani, in a European. The only organism found in the stools was the common mite, *Tyroglyphus longior*. Since the diarrhoea yielded to ordinary treatment the author does not lay that item to the charge against the mite.

A. A.

TALICE (R. V.). Sur quelques larves de *Trombidinae* de l'Uruguay, parasites des animaux. [**Larvae of Uruguayan Trombidinae that parasitize Animals.**]—*Ann. Parasit. Humaine et Comparée*. 1929. Nov. 1. Vol. 7. No. 6. pp. 481-493. With 5 text figs. [18 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The manner in which Trombicula larvae attach themselves to the host and suck its blood is here studied by means of sections of the host's skin and the larvae attached to it.

A. A.

FOLEY (H.) & PARROT (L.). Sur l'existence d'*Ornithodoros maroccanus* Velu en Algérie (Sud-Oranais). [**On the Occurrence of Ornithodoros maroccanus Velu in Algeria.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. p. 436. [Pasteur Inst. of Algeria, Algiers.]

SERGEANT (Et.) & PARROT (L.). Sur la répartition géographique de *Ornithodoros maroccanus* Velu en Algérie. [**On the Geographical Range of Ornithodoros maroccanus Velu in Algeria.**]—*ibid.* pp. 436-437. [Pasteur Inst. of Algeria, Algiers.]

The information combined in these papers is that *Ornithodoros maroccanus* has been found in southern, eastern, and western Algeria in burrows of the gerbille and the jumping-mouse—those typical desert animals, and that it sucks the blood not only of mammals, but also of toads that shelter in the burrows.

A. A.

PAWLOWSKY (E. N.) & CHODUKIN (N. J.). Ueber die Antikoaguline und andere wirksame Bestandteile der Zecke *Ornithodoros papillipes* Bir. [**Anticoagulin and Other Active Properties of Ornithodoros papillipes Bir.**]—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 90-96. [10 refs.] [Military Med. Acad., Leningrad.]

Observations showing that the salivary glands in both sexes of *Ornithodoros papillipes* secrete an anticoagulin, which strongly haemolyses human

blood and quickly agglutinates the red cells. The gut of this tick also produces anticoagulin. During the act of suction the coxal glands do not pass their secretion.

A. A.

COLAS-BELCOUR (Jacques). Sur l'identité d'*Ornithodoros erraticus* Lucas et d'*Ornithodoros maroccanus* Vêlu. [**Identity of *Ornithodoros erraticus* Lucas and *Ornithodoros maroccanus* Vêlu.**—*C.R. Acad. Sci.* 1929. Dec. 30. Vol. 189. No. 27. pp. 1316–1318. [4 refs.]

By careful comparative study the author decides that *Ornithodoros maroccanus* described by VÊLU in 1919 is identical with *Ornithodoros erraticus* described by LUCAS, in 1849, in his *Exploration scientifique de l'Algérie* (Zoologie, Fasc. 1, p. 316).

A. A.

COLAS-BELCOUR (Jacques). Présence d'*Ornithodoros coniceps* en Tunisie. [*Ornithodoros coniceps* in Tunisia.]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 265–267. [8 refs.]

Note of the finding of a larva of this species (formerly regarded as a variety of *O. talaje*) on a bat in a Tunis granary.

A. A.

FRANCHINI (G.). Distribuzione delle "Ixodoidea" nelle Colonie Italiane—Tripolitania. [**The Distribution of Ixodoidea in Tripolitania.**—*Arch. Ital. Sci. Med. Colon.* 1929. Feb. 1. Vol. 10. No. 2. pp. 49–51. With 1 fig. English summary p. 52. [Inst. of Trop. Path., Univ., Bologna.]

The local provenance, in Tripolitania, of 7 species of ticks, most of them widely distributed species, is graphically illustrated.

A. A.

FRANCHINI (Giuseppe). Distribuzione degli Ixododi (Ixodoidea) nelle nostre Colonie. Somalia (Oltre Giuba compreso). [**Distribution of Ixodide Ticks in Somalia.**—*Arch. Ital. Sci. Med. Colon.* 1929. Mar. 1. Vol. 10. No. 3. pp. 131–135. With 1 fig. English summary p. 135. [Inst. of Trop. Path., Univ., Bologna.]

A list of 29 species of ticks, with their local distribution, in Italian Somaliland.

A. A.

SMITH (R. O. A.). **Two Species of *Culicoides* which feed on Man.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 255–258. With 6 figs. on 1 plate.

Two species *C. actoni* and *C. varipalpis* from Assam described as new.

A. A.

LEPROSY.

COCHRANE (Robert G.). **Leprosy in the Far East.** With a Foreword by Sir Edward A. GAIT, K.C.S.I., C.I.E.—67 pp. British Empire Leprosy Relief Association, 29 Dorset Square, London, N.W. 1. 1929. World Dominion Press, 1 Tudor Street, E.C. 4. [2s.]

This is the third part of a world survey. It contains much interesting information including the following points. In Japan in 1925 the Government estimated 15,351 lepers, about 3,000 of whom are in five Government and seven private institutions, but some authorities have estimated the real number at 50,000 or over. A Japanese Leprosy Prevention Association is to be formed.

In Formosa the lepers have been estimated at 4,000 and only one institution, a mission hospital, is treating cases.

In Korea the numbers have been estimated at 20,000, mostly in the south, but the Government census shows only 4,641. Four leper homes, with about 2,000 inmates, are at work, and remarkable success has been obtained with the modern treatment at both Fusan and by Dr. WILSON at his recently transferred Roonchun colony.

The section on leprosy in China is by Dr. Henry FOWLER, who has long experience in that country. The true number of lepers is quite unknown, but the Kwantung and the other maritime provinces are most affected. The whole of the work for lepers is undertaken by missions, but it is greatly handicapped by the unsettled state of the country. In Kwantung some 600 lepers are cared for, but much smaller numbers or none at all in the other provinces. Ill-drained areas suffer most and large tracts of the interior and north have few cases, but the aboriginal tribes seem to be very susceptible. It is hoped that the recently established Chinese Mission to Lepers will improve the present very unsatisfactory conditions.

In the Philippines the incidence is estimated at 10,000, or 1 per mille. The well-known work of the Americans at Culion is mentioned and the success of the modern treatment there, and still more in the recently established treatment hospitals near large towns, in permitting over 1,000 releases is emphasized.

In the Dutch East Indies, 4,300 lepers are segregated in 43 homes, and the total number is unknown, but has been estimated at fifty to sixty thousand.

In British North Borneo the lepers are estimated at 500 to 1,000; only 50, mostly Chinese, are segregated. The disease is largely due to Chinese immigrants, and it is suggested that closer supervision at the time of their entry would reduce the prevalence of the disease.

In the Federated Malay States and the Straits Settlements Chinese are most affected, but the indigenous races also have a number of cases and the total number is unknown. Some 1,200 are segregated in three well-known colonies.

In French Indo-China the number of lepers is estimated at 30,000 and 5,994 are interned in leper villages with attached hospitals.

In Siam leprosy is very prevalent, and in 1920 8,457, or about 1 per mille, were enumerated, but the real number has been variously estimated at from 20,000 to 50,000. The enlightened ruling family help to support leper institutions, the two best of which have 550

inmates. Mission hospital out-patient treatment with a leper home has enabled 400 lepers to be treated in the north.

Prophylaxis.—Throughout this publication the necessity of attracting the early cases to come to colonies or hospitals for treatment, if any real progress is to be made in reducing leprosy, is emphasized, and the disadvantages of rigid compulsory segregation methods in causing such early amenable cases to be hidden until no longer favourable for treatment is insisted on.

L. Rogers.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE. TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 2. pp. 305-393. [14 Papers on Leprosy.]

As usual with congress papers, this series deals chiefly with previously published work already dealt with in this *Bulletin*, so they can be reviewed briefly. K. Raman TAMPI shows by a map that in the Travancore State, in the extreme south-west of India, the damp coastal areas show most leprosy. The 2,058 known lepers give an incidence double that of India as a whole; the northern division has most rainfall and most lepers. R. Row reports further cases treated with his tubercle bacillus autolysate with considerable improvement, illustrated by photos, and D. D. KAMAT and V. Y. RANDIVE report promising results with both Row's vaccine and with chaulmoogra oil preparations. E. MUIR deals once more with the iodide treatment controlled by the sedimentation test, and also with the leprosy reaction and its treatment by antimony intravenously, and J. M. HENDERSON points out that these reactions cause a temporary leucocytosis, accompanied by a fall in the lipase content of the blood in the later stages of the reaction (as first pointed out by ROGERS) and an acceleration of the sedimentation rate, the latter lasting longer than the leucocyte increase. MUIR also advocates the use of iodides in making a diagnosis of clinically doubtful cases, as a prophylactic in contacts with lepers and in testing the reality of clinical cures. Drs. H. W. WADE and E. V. PINEDA, of the Philippines, contribute short papers on tuberculoid skin lesions and on the presence of the lepra bacillus in the placenta respectively.

Prophylaxis is dealt with by MUIR by means of the propaganda-treatment survey centres, which he advocates to enable leprosy to be stamped out of highly endemic areas such as west Bengal and east Bihar, where he organized this plan, with the result that within three weeks of opening a dispensary 300 leprosy patients, many in the early amenable stages, were attending from villages within a 10 to 15 mile radius. He points out that as compared with very expensive leper asylums this is a comparatively inexpensive way of reducing leprosy, as regards both capital and annual cost, by making full use of the improved treatment now available. In contrast with MUIR's plan we have a paper by R. S. DONALDSON, who is in charge of the Lady Willingdon Leper Settlement of South India with accommodation for 480 lepers, mostly advanced cases unsuitable for treatment, and he points out that few stay long enough to benefit much, as shown by the fact that there were 916 admissions and 760 discharges in the year.

L. R.

LEPROSY NOTES. 1929. Oct. No. 7. 32 pp. Issued Quarterly by the British Empire Leprosy Relief Association, 24 Cavendish Square, W. 1.

LEPROSY REVIEW. 1930. Jan. Vol. 1. No. 1. pp. 1-32. Quarterly Publication of the British Empire Leprosy Relief Association. 29 Dorset Square, London, N.W. 1.

The October number of "Leprosy Notes" includes information on the disease in China, Japan and Canada and Burma. In the last Dr. P. M. C. PEACOCK, who has run a leprosy out-patient clinic in Mandalay for some years, largely at his own expense, records the great value of visiting the houses of the patients, as shown by three instances in which two more early cases were found in each by such visits. In this way early cases may be obtained and cleared up by treatment without isolation and thus prevented from going on to the infective stage. [This plan was advocated in "Leprosy" several years ago.] At Weihaiwei in North China Dr. Francis CLARK has carried the treatment to lepers in surrounding villages with the aid of a motor bicycle with beneficial results. Dr. James L. MAXWELL, with long experience in China, urges that any attempt at compulsory segregation in that country is doomed to failure, but extended treatment of early cases is urgently needed. R. G. COCHRANE writes on iodides in leprosy and points out how easy it is to do harm with this powerful drug. He warns against the method being used as a routine one and urges those without much experience to avoid the use of the drug. J. D. PAGE deals with the history of leprosy in Canada and the Tracadie Lazaretto of New Brunswick; he records that in the last ten years eleven patients have been admitted from six different provinces of Canada, and 20 cases are known. He urges that the early diagnosis should be taught in medical schools.

The January issue of this quarterly has appeared in a slightly enlarged form under the title of "Leprosy Review," but with similar scope, to enable the increasing number of articles to be accommodated, under the editorship of Dr. Robert G. COCHRANE, the Secretary of the British Empire Leprosy Relief Association, who contributes an article on Prognosis in Leprosy. Ocular leprosy is dealt with by H. KIRKPATRICK and by P. HOWELL, the Kahn reaction by R. L. KAHN, the pathological changes of the nervous system by H. P. LIE of Norway, industrial therapy by R. M. WILSON of Korea, who built a new model leper settlement by the labour of the lepers themselves, and Henry FOWLER deals with leprosy in Korea; making altogether a useful start for the review in its new form.

L. R.

CARMOUZE. Fréquence et prophylaxie de la lèpre en Guyane française. [**Frequency and Prophylaxis of Leprosy in French Guiana.**—*Scienza Med.* 1929. Aug. Vol. 7. No. 8. pp. 392-394.]

In the Cayenne area 350 lepers have been recognized in the last five years by the Institute of Hygiene, which forms a clinic for regular treatment, and 140 more are isolated elsewhere. Hyrganol injections are used, but the results have not been very great, so he thinks treatment should be obligatory and should be improved to make it more rapid and effective.

L. R.

GOÑZÁLEZ (Eudoro). Datos para el estudio de la distribución y profilaxia de la lepra en Venezuela. [**The Distribution and Prophylaxis of Leprosy in Venezuela.**—*Gac. Méd. de Caracas*. 1929. (25° Aniv. Acad. Nac. de Med. Numero extraord.) pp. 9-15.

Two districts only are dealt with, La Providencia in which the registered lepers in April 1929 numbered 542 (373 males and 169 females), and Cabo Blanco 271 (154 males and 117 females). The total in Venezuela is not known, but the number is certainly increasing.

In the districts named antileprol is used for treatment, and in La Providencia, of 226 patients treated by intravenous or intramuscular injection, 160 or 66·37 per cent. have improved, and 30·98 per cent. have remained in the same condition. In Cabo Blanco 195 have received the treatment, 72 intravenously, 123 intramuscularly. The results of these injections are to be published later.

H. Harold Scott.

GUERRERO (G. Rodriguez). Enquête sur la lèpre en Uruguay. Quelques vues sur la prophylaxie. [**Leprosy in Uruguay.**—*Rev. d'Hyg. et de Méd. Préventive*. 1929. Nov. Vol. 51. No. 11. pp. 818-833. [6 refs.]

The writer sent a questionnaire repeatedly to all the doctors in Uruguay, and eventually obtained replies from 95 per cent. of them. From these he concluded that the total maximum number of cases is 350, or 0·19 per mille. The nerve forms were 56 per cent., the nodular 16 and mixed cases 28 per cent. Monte Video showed by far the largest numbers, the coastal area more than in the interior, and some imported cases were met with. The great majority received no treatment, although treatment is the best prophylactic measure at present. He advises the Norway humane system of isolation with home isolation when suitable, combined with regular modern treatment and the medical supervision of all family contacts. Notification of all cases should be enforced.

I. R.

MEDEIROS (Luiz). Contribuição á epidemiologia da lepra no Paraná. [**Leprosy in Paraná.**—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 265-278. [1 ref.]

Souza ARAUJO in 1919 reported that the number of lepers in Paraná in 23 districts was 380. In 1926 the São Roque Leprosarium was inaugurated and it is calculated that there are now nearly 700 in the entire State, of which 417 have been registered. No less than 270 of these are farm labourers. Regarding sex distribution, 280 are adult males, 115 women; 22 are children. The vast majority developed the disease between the ages of ten and forty years; of 370 of whom the ages were ascertained, 91 acquired infection in the second decade, 109 in the third and 96 in the fourth. 268, or 64·3 per cent., had the definitely nodular form, while another 39 exhibited the same in an early stage; 68, or 16·3 per cent., the nervous form, and 42, or 10 per cent., the mixed.

H. Harold Scott.

FONTES (Pedro). A lepra no Estado do Espirito Santo. [**Leprosy in Espirito Santo.**]*—Folha Med.* 1929. Dec. 15. Vol. 10. No. 35. pp. 430–431.

The Leprosy Preventive Service in the State of Espirito Santo, Brazil, had noted in August 1927 that there were 30 cases of this disease. At the request of Dr. ARAUJO the author made a detailed investigation in each of the towns and villages, consulting at the same time the local medical men. He found 180 cases, many of which were proved by bacterial examination. The majority were found on the frontiers between Minas and Rio respectively and he believes that many are cases imported from neighbouring States.

H. Harold Scott.

MEDULLA (Candido). Casi di lebbra in Cirenaica. Contributo alla casistica ed all' epidemiologia. [**Leprosy in Cyrenaica.**]*—*13 pp. [18 refs.] 1928. Bengasi. [Cyrenaica: Ospedale Coloniale di Bengasi.]

During the years 1905–11 cases of leprosy were fairly common in Cyrenaica; 81 were noted in Benghazi. In 1926 only four cases could be found, and seeing that two of these have died and the others have left the district, the author believes that Cyrenaica is now free of the disease.

H. Harold Scott.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1929. Sept. Vol. 21. No. 9. pp. 1559–1560.—La lèpre en Norvège au cours des années 1910 à 1925. [**Leprosy in Norway, 1910 to 1925.**]

At the end of 1925 the lepers in Norway had become reduced to 107 from 160 in 1920, or by 67 per cent. 72 remain in the Bergen leper institution. A table of the distribution in Norway is given.

L. R.

PALDROCK (A.). **Some Observations upon Leprosy in Estonia and its Treatment.***—Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 445–460. With 5 figs. [16 refs.]

In this note the author's well-known views are repeated once more. He claims that the local application of carbonic acid snow to lepra nodules is a "specific" treatment, although he admits that after a time no further progress results, and he then resorts to injection of the gold preparation, solganol. He states that there are now 236 known lepers in Estonia, and he thinks the numbers are stationary.

L. R.

WEIDEMANN (M.) & KARTIN (A.). Ueber die Verteilung der Blutgruppen bei Leprösen in Lettland. [**Distribution of Blood Groups among Lepers in Latvia.**]*—Med. Klin.* 1929. May 10. Vol. 25. No. 19 (1274). pp. 751–752. [4 refs.] [Inst. of Forensic Med. & Path. Anat., Latvian Univ., Riga.]

The blood groups of lepers in Latvia have been investigated in the hope of throwing light on the question whether this factor influences

the predisposition to leprosy in certain races and their infectivity. For this purpose 106 lepers have been studied in a Riga asylum, with 37 per cent. of O group, 34 per cent. of A, 17 per cent. of B, and 9 per cent. of AB. On comparing these data with those of 1,160 non-leprous persons very little difference was found except that the B group was rather more frequent than in the leprous series. Leprosy is more common among the original inhabitants of Livonia and among the Finns, whose blood grouping is very similar, but other races living in close proximity to them remain more or less immune, so the authors think that there is some racial predisposition to leprosy. They conclude, however, that there is no definite relationship between this predisposition and the blood grouping of the different races.

L. R.

- i. KIRSCHFELD (E. P.). Les " kischlaks " des lépreux dans la circonférence Sourhan Dharyine en Ouzbékistan. [**Lepers in S. Russia.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 5. pp. 342-348. [In Russian. French summary pp. 348-349.]
- ii. —. Les villages d'isolation des lépreux—Kichlak-Makhaou—à Ura-Tube dans le Tadgikistan.—*Ibid.* No. 7. pp. 487-489. [2 refs.] [In Russian. French summary pp. 489-490.]

i. In the first of these notes the author records a visit to a colony containing 3 lepers with 21 cases of vitiligo and 8 other persons, owing to the people not distinguishing nerve leprosy from vitiligo. The people all lived by begging.

ii. In the second note he deals with the disease at Bokhara, where he found 3 lepers, 3 vitiligo cases and 8 healthy persons in a village. He advises medical examination of suspected lepers and isolation of true cases.

L. R.

BRENNAN (C. H.). **An Account of a Leper Lazaretto.**—*Kenya & East African Med. Jl.* 1929. Nov. Vol. 6. No. 8. pp. 233-235.

During 1928 the leper camp at Kakamega, North Kavirondo, with about 50 lepers, was not very satisfactory, but huts were built, with a dispensary and small hospital. The increased comfort resulting caused the number of voluntary inmates, for no compulsion is attempted, to increase to over 100; each occupant of a hut has a strip of ground which he cultivates, so that the majority of the lepers will soon be self-supporting as regards food.

L. R.

BLANCHARD (R. M.). **A Day at Kalaupapa.**—*Milit. Surgeon.* 1929. Sept. Vol. 65. No. 3. pp. 379-386. With 2 figs.

The author accompanied the annual visit of Hawaii authorities to the famous Molokai leper settlement; he gives an interesting account of his experience. He found Brother Joseph Dutton, one of Father Damien's colleagues, quite well after 43 years' work among the lepers. A government institution built twenty years ago for the study of leprosy remains unused, and only about one-tenth of the patients, who are advanced ones, attend for treatment. The disease is decreasing in Hawaiian territory. The more favourable cases are treated at the Kalihi leper hospital near Honolulu with good results in the less advanced ones, only hopeless cases being sent to Molokai, where they live under natural conditions in their own houses and appear to be fairly contented and well cared for.

L. R.

ROGERS (Leonard). **Recent Advances in the Treatment and Prophylaxis of Leprosy.**—*Edinburgh Med. Jl.* 1930. Jan. Vol. 37. No. 1. pp. 1-27. [88 refs.]

This is the Carmicheal Prize Lecture delivered before the Edinburgh University. It contains the history of the recent advances in treatment, and emphasizes that the power we now possess to clear up the majority of the early cases of leprosy renders obsolete the old Middle Ages rigid compulsory segregation, which causes the early amenable cases to be hidden until they have become infectious and much less curable. It should therefore be modified by allowing early cases to be treated at clinics, hospitals and by private practitioners. The extensive bibliography should be useful to students of leprosy.

L. R.

HUIZINGA (Lee S.). Nieuwe bijdrage tot de kennis van het vraagstuk der lepra. [**New Work on Leprosy.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. Jan. 11. 74th Year. 1st Half. No. 2. pp. 136-140. [9 refs.]

Our knowledge of leprosy has advanced but little except in regard to its treatment. A peculiarity of the *Mycobacterium* group to which the leprosy bacillus, along with the tubercle, smegma and butter bacilli, belongs, is its polymorphism. Branched forms occur and forms which are intermediate between the ordinary bacteria and filamentous organisms. It is remarkable what numbers of bacilli can be found in the body and that survival should be possible under such circumstances. Some workers have been able to produce localized leprosy lesions in apes, but this is not true leprosy, for the bacilli are not found in pure culture in such lesions. Cultivation of the leprosy bacillus has not, until recent times, been successful, but claims have now been put forward that this has been accomplished. Intrauterine transmission of leprosy has been demonstrated. It has been asserted that the Wassermann reaction is negative in leprosy, but more controlled observations are necessary on this point. The calcium content of the blood serum of the leper is normal and there is no relation between this and absorption of bone. Rat leprosy is an interesting condition and has formed the basis of many experiments. It is not the same as human leprosy. The prolonged incubation period of leprosy would seem to point to the possibility of the bacillus remaining latent after infection has taken place or to its growing so slowly that years elapse before symptoms arise. We must bear in mind the possibility of the existence of various phases in the life-cycle of the bacillus, only one of which may be causative of human leprosy. Leprosy affects mainly the skin, nerves and superficial lymph glands. Nerves show thickenings and the skin shows nodules. Trophic ulcers, due to nerve affections, furnish no bacilli, whereas the exudate from ulcers developing as a result of perforation of subcutaneous lepromata contains countless leprosy organisms. The characteristic lepra cells are probably endothelial leucocytes or macrophages which have phagocytosed the organisms but exert upon them little or no bactericidal action. Ophthalmologists estimate that 25 to 80 per cent. of lepers suffer from eye affections of one kind or another. Lepers appear to be immune to infection by pyogenic organisms. It is very essential that laboratory work on the subject should be supplemented by epidemiological investigation.

W. F. Harvey.

HUIZENGA (Lee S.). **Scientific Advances in the Study of Leprosy.**—*Nat. Med. J. China*. 1929. Aug. Vol. 15. No. 4. pp. 443-452. [11 refs.]

This is a lecture on recent advances in leprosy in which the fact is emphasized that the great improvement in treatment during the last fifteen years has resulted in the old leproseries, where "the dead still living" were collected, being converted into hospitals where the list of paroled and discharged as cured is increasing day by day.

L. R.

MUIR (E.). **The Infectiousness of Leprosy.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 620-623. [School of Trop. Med. & Hyg., Calcutta.]

After a brief discussion of the mode of infection in leprosy through prolonged close contact with an infectious case, the author points out that Bengal surveys show that villages with a single caste are least affected, but those with promiscuous intercourse of various kinds due to the presence of various castes mixed together have most cases. He next discusses the infectiousness of different types, the dermal active nodular B2 being the most dangerous through discharge of lepra bacilli from the nose, but even dermal cases with negative nasal discharge are very slightly infective. In early nerve cases the chances are not a billion to one that the bacilli will escape through the skin to cause infection, so the danger is absolutely negligible.

These facts have not been sufficiently taken into account in the older forms of prophylaxis, under which many uninfected cases have been segregated, and this measure and ostracizing bacteriologically negative lepers only leads to the early, more easily curable, cases being hidden until they have become infectious and difficult to cure. He therefore advises only the really infective cases being made to leave their employment, while the rest should continue their work, but attend regularly for out-patient treatment.

L. R.

LAMPE (P. H. J.). Het lot van de in een melaatscheninrichting uit melaatsche ouders geboren kinderen. [**The Fate of Children from Leprous Parents born in a Leper Asylum.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. Oct. 1. Vol. 69. No. 10. pp. 994-1006. With 1 fig. & 1 chart on 2 plates. [1 ref.]

The author found no difference between the fertility coefficient of the normal and the leprous woman in Surinam (6.3 against 7.3). The high infant mortality of the children born in the asylum is probably in great part due to complicating parental syphilis. Of the remaining children, who are evacuated before the age of 1 year, in the course of time 26 per cent. get leprosy, but as only about 1.5 of them show signs of the disease before the age of 5, it is probable that most of the others are infected outside the asylum. In order to prevent as much as possible the infection of children born in a leper asylum it is necessary to evacuate them immediately after birth and to bring them up in surroundings free from leprosy. Certainty about such freedom practically never exists if the children return to the conditions in which their leprous parents lived.

W. J. Bais.

WAYSON (N. E.) & BADGER (L. F.). **Studies upon Leprosy. XLIX. Clinical Observations of "Early" or Moderately Advanced Cases.**—*Public Health Bull. No. 189.* Washington. 1929. Sept. 16 pp. [2 refs.]

This interesting detailed account is difficult to summarize. The authors mention that leprosy symptoms may first break out during pregnancy or lactation or at puberty. Most cases are of more than two years' duration on admission to hospital. The familiar early nerve and skin signs are well described, and the tendency to symmetry of the skin lesions is pointed out. Definite lesions were found most frequently on the legs, face, arms, buttocks, back, ears, chest and abdomen in that order, and most rarely on the palms, male genitals, groin and axilla. Some loss of the eyebrows occurred in 10 to 15 per cent. In 98 per cent. of nerve symptoms evidence of peripheral neuritis occurred, and muscular paresis occurred predominantly in the hand muscles and next most often in the facial muscles. The febrile attacks are described. An analysis of cases released five years or more previously showed 100 relapses among 223 cases, 87 of whom were bacteriologically positive on admission and only 13 negative. In positive cases the lepra bacilli were demonstrated in 90 per cent. by skin snipping.

L. R.

TISSEUIL (J.). *Forme familiale de la lèpre. [Familial Form of Leprosy.]*—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 631-633.

The author points out that when two or more cases of leprosy occur in one family they are commonly all of the same type, either both dermal or both nerve cases, and he illustrates this by 8 series of cases. He has also noted a predominance of one type in certain indigenous tribes.

L. R.

DE CASTRO (A. Martins) & GOMES (L. Salles). *Bacillémie lépreuse pendant une poussée fébrile au cours du traitement d'une lèpre ancienne. [Leprous Bacillaemia during a Febrile Attack in Treatment of an Old Case.]*—*Bull. Soc. Française Dermat. et Syph.* 1929. Nov. No. 8. pp. 1082-1086. With 2 text figs. [4 refs.]

A case is recorded in which during a twelve-day febrile reaction numerous lepra bacilli were found in the blood from the veins, and especially from that of a finger without evident lesions. Cultures and inoculations into rats and guineapigs were negative.

L. R.

EUBANAS (Froilan). **Plantar and Palmar Manifestation in Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1929. Oct. Vol. 9. No. 10. pp. 358-360.

The author quotes HANSEN and LOFT and other old writers regarding the rarity of leprosy nodules on the plantar and palmar surfaces, and he reports a case with lesions in each of these positions proved to be bacteriologically positive. [Fig. 38 of "Leprosy" illustrates nodular leprosy of the palm in a case of E. MUIR.]

L. R.

BARRERA (F. de P.) & PEÑA CHAVARRIA (A.). **Manifestaciones agudas de la lepra. [Acute Manifestations of Leprosy].**—Reprinted from *Rev. Méd. Latino-Americana*. 1927. Mar. Vol. 12. No. 138. 33 pp. With 9 text figs. & 4 graphs. [13 refs.] French summary p. 34.

The authors deal with the familiar acute exacerbations of nodular leprosy more particularly. They agree with other writers that they are accompanied by degeneration of the lepra bacilli and are often followed by great improvement for a time, but the patients are highly infective in this stage owing to the great elimination of lepra bacilli in the process.

L. R.

LARA (C. B.) & NICOLAS (C.). **Efficacy of the Plancha, or Infiltration, Method of Treatment in Early Cases of Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1929. Sept. Vol. 9. No. 9. pp. 321-326. [8 refs.] [Med. Section, Culion Leper Colony, Philippine Is.]

VELASCO (Felix I.), ALONSO (José M.), LIMKAKO (Gabino) & FERNANDEZ (Guillermo) assisted by DEL ROSARIO (F. T.). **Treatment of the Chief Types of Cutaneous Lesions in Leprosy by the Plancha, or Infiltration, Method.**—*Ibid.* pp. 327-335. With 6 figs. [4 refs.] [Culion Leper Colony, Philippine Is.]

LARA (C. B.). **The Plancha, or Infiltration, Method of treating Leprosy.**—*Ibid.* pp. 336-343. With 5 figs. [10 refs.] [Med. Section, Culion Leper Colony, Philippine Is.]

These three papers deal with the method of injecting chaulmoogra oil preparations directly into the leprosy lesions. The authors mention that ROGERS used solutions of the sodium salts and McDONALD and DEAN the ethyl esters by this method with resulting rapid shrinking of nodules. In the Philippines this plan has been used in addition to intramuscular injections in patients with a few persistent lesions. In the present trials a number of injections into the affected skin are given to produce a wheal not more than 1 centimetre in diameter, and the total amount injected at one sitting should not exceed twice the usual intramuscular dose of 4 or 5 cc. of the ethyl esters. C. B. Lara and C. Nicolas report on five early and one slightly more advanced case found among the children born at Culion—the only early cases seen there—treated with the esters of *Hydnocarpus wightiana* oil, with the remarkable result that four of them became negative bacteriologically in one to two months and the remaining one in five months' treatment, the quickest results they know of in the literature, so they conclude that the infiltration method is even more effective than the intramuscular or subcutaneous.

The second paper deals with intradermal injections at the seat of leprosy lesions in place of Muir's subcutaneous ones in the chief types of the disease, namely, active macules, infiltrations and nodules, 100 of each being selected as showing fairly symmetrical lesions, so that one side could be kept as a control. The results were compared after ten months' treatment, and it was found that the macules responded best and the nodules least, none of the latter becoming bacteriologically negative. Twice as many of the treated lesions became clinically negative and nearly as large a proportion also bacteriologically negative as compared with the untreated control lesions. There was not much difference between the results obtained with iodized esters and with purified *H. wightiana* oil, and there was a steady increase in the number of negative cases in direct relation to the duration of treatment; with both the bacilli became granulated and gradually disappeared.

They conclude that the combined intramuscular and local injections were more effective than intramuscular alone. Photos of three cases illustrating the effects are given.

The third of this series of papers discusses the foregoing results and Lara's own experience. He concludes that the marked increase in the number of Culsion lepers becoming negative during the last two years is due to the adoption of the infiltration method, and he thinks local reactions, the local destruction of the bacilli by the drug and the increased lipase leading to destruction of the lipid material of the bacilli, as suggested by ROGERS, may all play a part in producing the good results noted.

L. R.

DE VERA (Bonifacio) & LARA (Casimiro B.). **Efficacy of Ethyl Chaulmoograte, Ethyl Hydnocarpate, and the Ethyl Esters of the Total Fatty Acids of *Hydnocarpus wightiana* Oil.**—*Jl. Philippine Islands Med. Assoc.* 1929. Sept. Vol. 9. No. 9. pp. 307-317. [18 refs.] [Culsion Leper Colony, Philippine Is.]

This paper records a trial in two series of 25 cases each of ethyl hydnocarpate prepared from *H. wightiana*, ethyl chaulmoograte made from *H. alcalae* oil of the Philippines, which contains mostly chaulmogric acid, and the mixed ethyl compounds of *H. wightiana* containing both preparations. The purified single esters products gave slightly better results than the mixed ones, which is attributed to their higher content in the active constituent, and the two esters were probably about equally active, contrary to the previous results of GREEN and HASSELTINE, who found ethyl chaulmoograte to be of little value.

L. R.

LABERNADIE (V.). Premiers essais sur l'action anti-lépreuse de l'huile d'*Hydnocarpus wightiana* irradiée ou additionnée d'ergostérine irradiée. [**Antileprous Action of Hydnocarpus Oil Irradiated or with Addition of Irradiated Ergosterol.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 759-762. [2 refs.]

In view of the variable results sometimes obtained by the use of *H. wightiana* oil in leprosy the author has tried specimens irradiated with a mercury quartz lamp and another sample to which 1 in 2,000 of ergosterol (irradiated vitamin D) was added, but owing to the very small amounts his observations were limited to the treatment of one case with each. He thinks the latter preparation was more effective in one case than the untreated oil.

L. R.

DE SANTOS (Irene) & WEST (Augustus P.). **Resins in the Seed Coats of Philippine Chaulmoogra Seeds (*Hydnocarpus alcalae*).**—*Philippine Jl. Sci.* 1929. Dec. Vol. 40. No. 4. pp. 485-491. With 2 figs. on 1 plate. [5 refs.]

SANTILLAN (Pura) & WEST (Augustus P.). **Chaulmoogryl Brom and Chlor Phenols.**—*Ibid.* pp. 493-497. [4 refs.]

COLE (Howard Irving). **The Constituents of *Hydnocarpus wightiana* Oil.**—*Ibid.* pp. 499-502. [6 refs.]

——. **Reduction of Irritation by Iodized Ethyl Esters of *Hydnocarpus wightiana* Oil.**—*Ibid.* pp. 503-509. With 2 plates. [10 refs.]

This is a further series of papers on the chemistry of chaulmoogra and other oils on which so much good work has been done in the Philippines.

(1) The Philippine *Hydnocarpus alcalae* is shown to contain 3.73 per cent. of resins in the seed coats. The tree and its seed are illustrated.

(2) Since the recent synthesis of some chaulmogryl substituted phenols four new chaulmogryl halogen phenols have been prepared, the highly technical chemistry of which is described. Esters were made rather easily but the reactions take place slowly.

(3) The fatty-acid with lower melting-point than hydnocarpic acid, namely, lauric acid, is reported to have been isolated from *H. wightiana* oil for the first time. A new optically active liquid fatty acid has also been obtained, but not yet in sufficient quantity to determine its composition.

(4) The addition of iodine to esters to lessen their irritant properties has for long been in use in the Philippines. The experiments now reported indicate that the most suitable preparation can be obtained by the following method. Fifteen litres of well-dried purified esters are heated in a 20-litre enamelled kettle at 140° C., and seven and five-tenths grams of U.S.P. resublimed iodine is added with stirring. The temperature rises to 150° C., at which it is maintained for 30 minutes with occasional stirring. After filtering into bottles they are sterilized for one hour at 150° C. They are used up to two years, but even after three they have not become markedly irritating.

L. R.

PEIRIER. Les *Caloncoba* à huile antilépreuse du Cameroun. [**Caloncoba Oil of the Cameroons in Leprosy.**—*C.R. Acad. Sci.* 1929. Sept. 23. Vol. 189. No. 13. pp. 471-472.]

The author states that the Flacourtiaceae, to which the Taraktogenos and *Hydnocarpus* belong, is represented in the African Cameroons by the *Caloncoba*, of which three species are now known, and he suggests the trial of preparations from their oil in leprosy.

L. R.

CANAAN (T.). Die Jodkalibehandlung der Lepra. [**Treatment of Leprosy by Potassium Iodide.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 645-654. [9 refs.]]

The author reports on a trial of potassium iodide in leprosy. He concludes that the remedy is by no means a harmless one, that in only quite a small percentage of cases is the drug beneficial, and that in a few patients better and quicker results are obtained than with other drugs, but it is still uncertain which forms and stages are most suitable for this form of treatment.

L. R.

SÉZARY (A.), DÉROT (M.) & GUÉDÉ (M.). Sur le traitement de la lèpre par les sels d'or. [**Treatment of Leprosy by Gold Salts.**—*Bull. Soc. Française Dermat. et Syph.* 1929. Nov. No. 8. pp. 1071-1074.]

The use of gold salts in tuberculosis and the variable results obtained with this metal in leprosy led the writer to carry out a four months' trial in three cases of leprosy with allochrysin (thio-propanol sulfonate double gold and sodium) by intramuscular injection in 25 centigramme doses. In one case only very transitory amelioration was noted, in the other two intravenous injections of the drug produced acute exacerbations of the disease, so that the treatment was actually harmful in them.

L. R.

AALSMEER (W. C.). Ervaringen bij de behandeling van Tuberculose en Lepra met Sanocrysine. [**Treatment of Tuberculosis and Leprosy with Sanocrysin.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. Sept. 1. Vol. 69. No. 9. pp. 889-893. [Dutch Indies Med. School, Soerabaja.]

Trials of sanocrysin in leprosy have after a few years led to the disappointing conclusion that no better results can be obtained than by other measures. The author had an opportunity to try sanocrysin in his Javanese patients, who proved to be very sensitive to the toxic action of the drug (erythema, albuminuria) as they are to the salts of other heavy metals (mercury). This made the use of larger doses (0.5-1 gm.) impossible, whilst smaller doses (100-200 mgm. once a week) had no noticeable effect.

In two cases of macular leprosy large doses caused an intoxication, after the healing of which the maculae were less pronounced, but the bacillus did not disappear from the nasal mucus, a result which might have been obtained just as well by protein shock treatment.

W. J. Bais.

COCHRANE (Robt. G.). **The Action of Ephedrine in relieving Certain Painful Accompaniments of Leprosy and Lepra Reaction.**—*Lancet*. 1929. Sept. 14. pp. 551-552. [3 refs.]

This paper records four cases of leprosy which confirm MUIR'S advocacy of this drug orally to control very rapidly the painful reactions of nerve leprosy under treatment with Hydnocarpus oil preparations, but it did not control the temperature reactions unless combined with potassium antimony tartrate. Temporary relief is also afforded to joint and bone pains.

L. R.

DE VOGEL (W.). Les expériences du Professeur C. D. de Langen sur la réaction de Bargehr. [**De Langen's Trials of Bargehr's Reaction.**]—*Bull. Office Internat. d'Hyg. Publique*. 1929. Aug. Vol. 21. No. 8. pp. 1332-1337.

This interesting paper confirms the earlier observations of BARGEHR (see this *Bulletin*, Vol. 24, p. 216) and also those of DE LANGEN and de Vogel (*l.c.*, Vol. 26, p. 616) on the skin reactions following injections of sterilized emulsions of lepromata. Positive reactions occur in those who have never been in contact with lepers and in cases of spontaneous recovery from leprosy, but active cases give no reactions, and also some persons who have been long in contact with lepers, from whom they have contracted light and latent infections. The lepromatous emulsions are sterilized at 120°C., and kept in dry powdered form in sealed ampoules, but it is not easy to obtain a suitable antigen. A little of the antigen is applied to a scarified surface of the skin, lightly rubbed in for 5 minutes and allowed to dry for one hour. In from 1 to 7 days later a slightly raised erythematous patch appears and may persist up to 5 or 6 weeks. Tests in nine family groups are recorded, and the healthy reacted, but not the

leprosy except in two cases who will be watched for any signs of the disease developing. Some very early cases gave negative reactions which were of diagnostic importance. An important field of investigation is opened up by the establishment of the value of this test.

L. R.

GOMES (J. M.). Desvio do complemento na lepra. [**Complement Fixation in Leprosy.**—*Brasil-Médico*. 1929. Oct. 12. Vol. 43. No. 41. pp. 1223–1230. With 2 text figs. [Hyg. Inst., S. Paulo.]

The author carried out this test in nearly 200 cases of leprosy, or suspected leprosy, using the defatted *Streptothrix leproides* of Deycke as antigen. Brief notes are given of (1) Eight cases in which the clinical signs were very slight, "practically absent," but whose sera gave a high degree of fixation; (2) nine cases in an early stage; (3) seven contacts whose sera were positive but who remained free from all symptoms of leprosy; (4) seven other suspected cases. He gives in tabular form notes on the duration of the disease, the clinical form when definite, the results of examination of the nasal mucosa and the results of the serological test of 196 cases. [Where the findings are stated as percentages, the reviewer is unable to follow the author, as the total of positive serum reactions amounts to 136·31 per cent. and the negatives to 83·77 per cent.] The conclusions drawn are:—

(1) That this antigen is of value, not only in diagnosis of the disease, but in determining the degree of infection; (2) a positive result in contacts exhibiting no signs of leprosy indicates immunity; (3) when the positive falls and becomes negating, clinical signs begin to appear, unless the cases are recent and reacting well to treatment; (4) cases of leprosy giving a negative reaction are in general mild.

H. Harold Scott.

MUIR (E.). **The Erythrocyte Sedimentation Test in Leprosy.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 488–489. With 1 text fig.

This paper confirms the value of the sedimentation test as a guide to the treatment of leprosy as described recently by Isabel KERR (see this *Bulletin*, Vol. 26, p. 1039). In carrying it out Muir advises taking 1·2 cc. of blood from the patient's vein into 0·3 cc. of 5 per cent. sodium citrate in a 2 cc. syringe, running the mixture into 300 millimetre pipettes graduated from 1 to 100, and standing them with their points in small holes in rubber corks. The top level of the erythrocytes is read off after 1½ and 2½ hours and the average of the two readings taken. Uninfected persons and the early stage give readings of 10 to 20, but in active dermal cases there is a fall of 30 to 60 points, and a well-marked increase occurs during a reaction, which is an indication for not giving another injection until it has fallen again. A gradual fall is of good prognostic value indicating the gradual elimination of the disease. The absence of any increase after large doses of iodides is also a favourable sign. Moreover, any drug which does not raise the sedimentation index is not likely to be of value in treatment.

L. R.

SHIGA (K.). **Cultivation of the Lepra Bacillus. (First Report.)**—*Japan Med. World.* 1929. July 15. Vol. 9. No. 7. pp. 213-217.

——. Studien über die Kultur der Leprabacillen. I. Mitteilung. —*Acta Med. in Keijo.* 1929. Vol. 12. No. 2. pp. 72-80. With 7 figs. on 3 plates (2 coloured). [Microbiol. Inst., Univ., Keijo.] Also in *Zent. f. Bakt.* I. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 511-518. With 2 text figs. & 3 coloured figs. on 1 plate.

In this very interesting paper Professor Shiga describes the apparently successful culture to a certain extent of the leprosy bacillus with the aid of Sumiyoshi's sulphuric acid method as used in his simple plan of cultivating the tubercle bacillus. Lepra nodules removed under sterile conditions were cut up and macerated in a mortar with 5 per cent. sulphuric acid and water, the material centrifuged, and the precipitate placed on potato medium, previously boiled in 4 per cent. glycerin-bouillon, which retains a moist surface for long. At the end of a month there was marked degeneration of the lepra bacilli, but after two months stained specimens showed an apparently new growth of masses of well-staining lepra bacilli, although no growth was visible, and subcultures of equally slow growth have been obtained to the third generation. In further attempts with slant agar media made in the same way as the potato one, but with a minimum of agar, small visible colonies were obtained. The cultures stain well by Ziehl's method and the bacilli show small meta-chromatic bodies within them.

L. R.

AOKI (T.) & AOKI (Y.). Ueber die Methode zur Unterscheidung lebender und toter Leprabazillen. [**Method of distinguishing Living from Dead Lepra Bacilli.**]—*Japanese Jl. Dermat. & Urol.* 1929. Oct. Vol. 29. No. 10. pp. 64-65. [Dermat. Hosp., Nagasaki.]

The authors describe a method of staining which they think will distinguish between living and dead lepra bacilli.

The specimen is first stained with erythrosin 1·0, picric acid 0·15 and distilled water 100 parts for five minutes at 80°. After washing it is placed for one minute in caustic potash 5·0, absolute alcohol 30 and distilled water 70 parts, washed again and then stained for one minute in 1 per cent. caustic potash 1 part, saturated alcoholic solution of methylblue 15 parts and distilled water 100 parts. The living bacilli are said to be stained a bright red, dead ones a dark violet blue and intermediate ones a light reddish violet to a blue violet colour.

L. R.

KOIKE (Totaro). Beitrag zur Histogenese der Leprazellen. [**The Histogeny of Lepra Cells.**]—*Okayama-Igakkai-Zasshi (Zent. d. Okayama Med. Gesellsch.)*. 1929. Apr. Vol. 41. No. 4. pp. 743-748. With 1 text fig. [15 refs.] [In Japanese. German summary pp. 749-750.]

This short paper deals with vital staining of lepra cells with a view to ascertaining their origin and nature; lithiumcarmine and trypanblue were chiefly used by injection into nodules, and were taken up by the lepra cells, but not by their vacuoles. This indicates a powerful phagocytic

action of the lepra cells such as is possessed by histioblasts, and it is suggested that the lepra cells are derived from those of the sebaceous and sweat glands of the affected skin.

L. R.

MOLINELLI (E. A.) & ROYER (M.). La urobilina y bilirubina sanguínea y urinaria en la lepra. [**Urobilin and Bilirubin in the Blood and Urine in Leprosy.**]—*Semana Méd.* 1929. Dec. 19. Vol. 36. No. 51 (1875). pp. 1799–1801. [6 refs.] [Inst. of Infect. Diseases, & Physiol. Inst., Faculty of Med. Sciences, Buenos Aires.]

— & —. L'urobiline et la bilirubine du sang et de l'urine chez les lépreux.—*C.R. Soc. Biol.* 1929. Dec. 13. Vol. 102. No. 34. p. 873.

These estimations were carried out on 16 lepers of ages varying between 16 and 71 years, who had suffered from the disease from 3 to 23 years; four were of the nervous type, two of the nodular, and ten mixed. The results were usually negative. Urobilin was not found in the blood and the quantity in the urine was not above normal except in one case, a patient with diabetes. Blood bilirubin was normal in all except one of those with mixed leprosy in a severe form, the patient dying within a year; in this case the amount was doubled. Bilirubin and bile-salts were also absent except in the case noted above as suffering also with diabetes.

H. Harold Scott.

WAYSON (N. E.), BADGER (L. F.) & DEWAR (Margaret M.). **Leprosy with Evidences of Abnormalities in Carbohydrate Metabolism.**—*Public Health Rep.* 1929. Dec. 6. Vol. 44. No. 49. pp. 2971–2983. With 3 charts in text. [10 refs.]

The authors report on the frequency of disturbances of carbohydrate metabolism found by a study of lepers in the Hawaii Kalihi hospital. Twenty-three per cent. of 175 lepers had glycosuria after fasting three hours or more, 80 per cent. showed abnormal glucose tolerance curves, and the basal blood sugar was commonly 20 per cent. higher than in controls.

L. R.

i MARKIANOS (J.). Développement rapide du virus filtrant de la lèpre des rats après inoculation aux jeunes rats. [**Rapid Development of Filtrable Virus of Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 758–759.

ii. —. Filtration du virus de la lèpre des rats.—*Ibid.* June 12. Vol. 22. No. 6. pp. 410–411.

iii. —. Le développement du virus filtrant avant sa transformation en bacille de la lèpre des rats.—*Ibid.* July 10. Vol. 22. No. 7. pp. 537–538.

i. In a short paper the author relates that rat leprosy virus after filtration through a 2L Chamberland bougie and injection into four young rats produced a rapid development of the disease with the appearance of acid-fast bacilli within 21 days, especially in the lymphatic glands. In an earlier paper (ii) he had shown that 3 to 9 months after inoculating similar filtrates into rats a few acid-fast bacilli could be

found in their glands. A month later (iii) he reported finding granular bacilli after 45 days and typical staining ones after 82 days in similarly infected rats.

L. R.

MARKIANOS (J.). Le rôle des poux dans la transmission de la lèpre. [**The Rôle of Lice in the Transmission of Leprosy.**—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 633-635.]

The author failed to transmit rat leprosy by the bites of lice fed on infected rats, or by oral administration of broken up lice infected by feeding on leprosy rats, but on inoculating the last fluid into rats they became infected.

L. R.

DA MATTA (Alfredo Augusto). Prophylaxia da lepra. [**Prophylaxis of Leprosy.**—*Brasil-Medico.* 1929. Sept. 14. Vol. 43. No. 37. pp. 1091-1096. [31 refs.]]

After describing the bacillus, the attempts at its cultivation and the possible modes of dissemination, the author divides prophylactic measures into two main groups, aggressive and defensive. The former includes: compulsory notification of all cases and even suspected cases, and isolation or segregation in leprosaria, or colonies, with a hospital, or, where circumstances and the public health laws permit, domiciliary observation and treatment. The latter (defensive) includes: vigorous inspection of all those living in contact with lepers, dispensaries for periodic examination of suspects and treatment of early cases, a crèche for the children born of leprosy mothers, and systematic campaign against flies and biting insects in the colonies and residences of lepers and their environment.

H. Harold Scott.

- i. TOURNIER (E.). Le traitement de la lèpre par l'iode. [**Treatment of Leprosy by Iodide.**—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 762-764.]
- ii. PINARD (Marcel), RABUT, GIRAND & ABRICOSOFF. Maladie de Hansen traitée par la malariathérapie. [**Leprosy treated by Malaria therapy.**—*Bull. Soc. Française Dermat. et Syph.* 1929. July. No. 7. pp. 648-649.]
- iii. DE VERA (Bonifacio). **Observations on Kahn-Positive Lepers treated with Neosalvarsan and subsequently with the Mixed Ethyl Esters of Hydnocarpus Wightiana Oil.**—*Jl. Philippine Islands Med. Assoc.* 1929. Sept. Vol. 9. No. 9. pp. 318-320. [1 ref.] [Med. Section, Culion Leper Colony, Philippine Is.]
- iv. MACHT (David I.). **Phytopharmacological Reactions of Blood Serum from Leprosy, Tuberculosis and Syphilis.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Nov. Vol. 27. No. 2. pp. 150-152. [6 refs.] [Pharmacol. Research Lab., Hynson, Westcott & Dunning, Baltimore.]
- v. MOLINELLI (E. A.) & VACCAREZZA (A. J.). Le liquide céphalo-rachidien dans la lèpre. [**Cerebrospinal Fluid in Leprosy.**—*C.R. Soc. Biol.* 1929. Dec. 13. Vol. 102. No. 34. pp. 87-873.]

i. This is a report of a single nerve case treated with iodine orally with fairly rapid improvement in recently developed lesions and very slow improvement in older ones.

ii. The author reports one case of leprosy in which temporary amelioration followed an artificial benign tertian infection, but it was of very short duration.

iii. B. de Vera records a trial of neosalvarsan in 20 Kahn-positive lepers as a preliminary to antileprosy treatment, but found it did not increase the efficiency of the latter treatment.

iv. The author now reports that 22 specimens of leprosy sera sent to him showed a toxic effect on the growth of *Lupinus albus*, the average phytotoxic index being 47 per cent. (see this *Bulletin*, Vol. 28, p. 619, for previous paper).

v. The examination of the cerebro-spinal fluid of 69 lepers showed it to be normal and of no diagnostic or prognostic value.

L. R.

- ELISEO MONTAÑA. Estado actual de la lucha contra la lepra en Colombia. (La conferencia del profesor Burnet.)—*Reperi. Med. y Cirug.* Bogota. 1929. Apr. Vol. 20. No. 4 (232). pp. 172-179.
- DA MATTIA (Alfredo Augusto). Prophylaxia da lepra.—*Sciencia Med.* 1929. Oct. Vol. 7. No. 10. pp. 497-508. [31 refs.]
- MOHANTY (L. N.). Two Cases of Leprosy successfully treated.—*Indian Med. Gaz.* 1929. Dec. Vol. 64. No. 12. pp. 694-695.
- TRIOLETT (R.). Sur un cas de lèpre autochtone constaté sur les Hauts-Plateaux constantinois.—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 492-493. [1 ref.]

SPRUE.

- i. MACKIE (F. P.), FAIRLEY (N. H.) & STAFF OF THE HAFFKINE INSTITUTE. **Progress Report on the Sprue Inquiry.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 248–257.
- ii. MANSON-BAHR (Philip), MAYBURY (L. M.) & MARTIN (P. H.). **On the Therapeutic Value of Blood Transfusion in Sprue Anaemia.**—*Ibid.* pp. 258–263. [1 ref.]
- iii. MARTIN (P. H.). **Note on the Agglutinin Systems.**—*Ibid.* pp. 263–266. [10 refs.]
- iv. SOKHEY (S. S.) & MALANDKAR (M. A.). **Pancreatic Function in Sprue.**—*Ibid.* pp. 267–268.
- v. — & GOKHALE (S. K.). **Liver Function in Sprue.**—*Ibid.* pp. 269–270.

i. All the information in this paper has appeared in the *Indian Journal of Medical Research* and has been adequately reviewed in this *Bulletin*.

ii. In a certain proportion of sprue cases, especially in those of long standing and in patients over fifty years of age, a pernicious anaemia may be the outstanding feature of the disease. In some cases a sudden liberation of haemolytic toxin takes place with the production of a rapidly progressive anaemia which may prove fatal in a few days. In eight fatal cases of sprue occurring in the Hospital for Tropical Diseases, London, during the last seven years, no less than five died of this pernicious anaemia. No therapeutic measures in sprue give such brilliant results as does blood transfusion. The protocols of five cases of extreme anaemia in sprue are cited in detail, the first having been transfused on March 29th, 1926. From a study of these cases it is concluded that the therapeutic value lies not so much in the replacement of destroyed blood corpuscles as in the stimulation of the haemopoietic system. In two instances more than one blood transfusion was necessary in order to obtain the desired result, while the impression is gained that the actual amount of blood injected is a secondary matter. In the 5th case cited brilliant results appear to have followed the injection of a comparatively small quantity—70 cc. In very severe cases of sprue anaemia with 400,000 red cells per cmm. of blood, the injection of amounts larger than 300 cc. should not be attempted. The stimulating effect of blood transfusion was seen in the first patient, who was able to surmount successfully an attack of lobar pneumonia during convalescence. In order to obtain the full benefit of blood transfusion the strictest dietetic measures must be carried out. Regeneration of the blood is greatly aided by the exhibition of liquor arsenicalis in the initial dose of 1 minim daily, gradually increased to 15 minims. In regard to the effect of the liver diet of MINOT and MURPHY in Addisonian anaemia the value of liver soup has long been recognized in sprue anaemia. All patients received 8 ounces of strong liver soup daily. A reaction with pyrexia following blood transfusion is more generally attended by beneficial results. The simplest technique of blood transfusion has given the best results and the citrated method alone has been used. Stress is laid on the importance of

direct testing for compatibility being performed with the donor's red blood corpuscles and the recipient's serum immediately prior to transfusion.

iii. In a note on the agglutinin system, P. H. Martin records that one of the recorded cases (No. 4) presented signs of auto-agglutination.

The dependence of autoagglutination on low temperature was demonstrated. The serum was left in contact with the patient's own washed red cells in the coagulation tube and kept at low temperature. These factors appear to have destroyed some part of the agglutinin system. In the transfusion of this case a mild reaction of incompatibility occurred and mild haemoglobinuria resulted which lasted 24 hours.

iv. These workers employed the modern duodenal tube method to examine the pancreatic ferment in the duodenum in sprue and, at the same time, they analysed the fat content of the faeces for any information on the subject of pancreatic efficiency. Employing Saxon's wet method of fat analysis of faeces, they found that in only one out of a series of seventeen cases did neutral fat exceed 60 per cent. of the total fat content, whilst all cases except one showed normal splitting of fat. Quantitative estimation of diastase, trypsin and lipase in the duodenal contents of five cases showed these ferments present in normal amounts. They conclude that the pancreas functions normally in sprue. The total fat content of 14 out of a series of 17 sprue cases was high, ranging from 37.8 per cent. to 60.7 per cent. of total dry matter. The fat content of the faeces is connected with the consumption of milk and is found in diseases other than sprue when the patients are kept in bed and on a milk dietary. The high fat content of the faeces does not disclose anything peculiar to sprue.

v. Thirteen cases of clinical sprue were studied. The functional tests were the laevulose tolerance test, the Van den Bergh reaction, nitrogen partition of the blood and the bromsulphalein test of Rosenthal and White. Nitrogen partition did not reveal any inefficiency; the bromsulphalein dye tests yielded negative results, except in one patient who was almost moribund. They found an increase of serum bilirubin in 6 out of 13 cases as shown by the indirect Van den Bergh reaction. This increase of serum bilirubin they attribute to an increased destruction of erythrocytes. Seven cases gave abnormal laevulose tolerance curves. Probably inanition rather than a pathological condition of the liver is responsible for this.

P. H. Manson-Bahr.

WEISS (Charles) & WEISS (Dorothy Wilkes). **An Epidemiological Study of Tropical Sprue in Porto Rico.**—*Porto Rico Rev. of Public Health & Trop. Med.* 1929. Feb. Vol. 4. No. 8. pp. 333-343. With 1 map. [18 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

From an examination of the records of the Bureau of Vital Statistics of the Porto Rico Department of Health, it was found that a total of 322 deaths had occurred from sprue between July, 1924, and December, 1927, or an average of 92 cases a year in a population of 1,400,000. The incidence of sprue was lowest in the mountainous interior of the Island; the rate in the principal municipalities varied from 0 to 27 per 100,000. In a study of sprue in relation to climatic conditions, altitude, rainfall, temperature and humidity, no absolute correlations were

discovered though, in a general way, the sprue incidence is greatest in those parts of the Island where the climate is hot and dry. Deaths from sprue are more frequent in the female sex, there being 170 females to 152 males. Old people supplied the greatest number with middle-aged persons next in order. Only 4 of the 322 deaths were in children from 1 to 5 years in age. In respect to race, there were four times as many sprue deaths amongst white as amongst coloured; the official proportion of white to coloured in the general population is given as 3-1. Native-born Porto-Ricans, Continental Americans and Europeans appear to be equally susceptible.

P. H. M-B.

VAN LOON (F. H. G.). **Tropical Neurasthenia and Sprue.**—*Jl. Trop. Med. & Hyg.* 1929. Mar. 1. Vol. 32. No. 5. pp. 59-63. [2 refs.]

In Batavia a great number of neurasthenic patients are treated. Out of a total of 2,068 (1,313 Europeans and Indo-Europeans, 641 Chinese and 114 Malays) during a period of three and a-half years, 766 were neurasthenics.

Patients suffering from tropical neuroses complain of all kinds of physical inconveniences. The author firmly believes that the tropical climate exerts a specific influence upon the nervous system, causing an insufficiency of the different parts of the vago-sympathetic nervous system resulting in asthma, itching, congestion and spastic constipation. Frequent mention has been made of the specific influence of the tropical climate on the digestive system and, though it is not intended to give point to the possible nervous origin of sprue, yet the neurological states in sprue require further investigation on the part of the neurologist.

Two of the author's own colleagues who had been suffering from sprue informed him of their conviction of the existence of a nervous element as the initial cause of sprue diarrhoea.

P. H. M-B.

VAN LOON (F. H. G.). **Autonome insufficiëntie en spruw.** [**Autonomic Insufficiency in Sprue.**]- *Nederl. Tijdschr. v. Geneesk.* 1929. Mar. 30. 73rd Year. 1st Half. No. 13. pp. 1593-1599. [1 ref.]

Van Loon once more gives his views on tropical neurasthenia (see this *Bulletin*, Vol. 24, p. 824), in the clinical picture of which hypersecretion of various organs, e.g., diarrhoea, predominates. All these symptoms may be explained by over-irritation and subsequent insufficiency of the autonomic nervous system. The symptoms of tropical neurasthenia have a certain likeness to those of the early stages of sprue (watery diarrhoea, especially in the early morning, alternating with periods of constipation, dryness of the mouth, general irritability) and the author thinks that so far too little attention has been paid to the nervous complaints in sprue conditions. Sprue is not a disease of the natives of tropical countries, but of the European colonists, exposed to the neurasthenia promoting influences of tropical life. Many sprue patients are primarily psychically unbalanced individuals. From this and much other rather speculative argument the author concludes that the commonly accepted "constitutional weakness"

and "endocrine insufficiency" as causes of sprue are to be replaced by "digestive-autonomic breakdown and insufficiency" as sequels of tropical life. Upon this foundation the whole complex of sprue with its endocrine and toxic disturbances may develop.

W. J. Bais.

MARTIN (S. H.). **Relation of Sprue to Pernicious Anaemia. (Preliminary Report.)**—*China Med. Jl.* 1929. Feb. Vol. 43. No. 2. pp. 129–130.

Without any definite reasons, sprue is assumed to be a deficiency disease. In twelve cases of pseudo-sprue, uniform good results have been obtained by the use of liver extract and the free use of vitamin-rich food, especially tomatoes.

P. H. M-B.

MANSON-BAHR (P. H.). **Sprue Indigenous to Nyasaland.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. June 30. Vol. 22. No. 1. pp. 81–82. [2 refs.]

The author has searched for records of sprue from Central Africa. He could find only that TAUTE (1919) reported rather hazily that three sprue-like cases were noted amongst German troops in the last East African campaign; and that BEGG (1912) mentioned cases of sprue from the upper Congo, in his practice, but gave no adequate details. There are medical officers and a considerable European population in Central Africa. This negative evidence about sprue may therefore be of value in considering its etiology and, moreover, adds importance to this, the first proper record of a case of sprue from Central Africa.

The male patient, aet. 28 years, was born in South Africa, but had resided for the last 10 years in Nyasaland, mostly at Blantyre. He came under the author's medical care in March, 1927: for three months previously he had suffered from loss of weight and diarrhoea—5 or 6 large white frothy stools a day; he thought he had had a somewhat similar attack lasting two months in 1919. He was found to be passing large clay coloured stools, 12 oz. weight. Analysis gave total fat 29.2 per cent., combined fatty acids 8.4 per cent., neutral fat 4.4 per cent., free fatty acids 16.5 per cent. He had lost 28 lbs. weight; haemoglobin 85 per cent., red cells 4,500,000 per cmm.; fractional test meal showed absence of HCl and decrease of total acidity. Sigmoidoscopy revealed the changes [described first by the author] pathognomonic of early sprue—viz., pink oedematous mucous membrane, with white faeces in the gut lumen.

The author notes that, as in many cases of Indian sprue, this case showed no lesions of tongue or buccal mucosa. He comments on the possibility that conditions in Central Africa have arisen which predispose to sprue; or the virus imported by Indian immigrants has found suitable soil to flourish in, and infect the susceptible European.

H. M. Hanschell.

MANSON-BAHR (Philip). **On Non-Tropical or Indigenous Sprue.**—*Jl. Trop. Med. & Hyg.* 1929. May 1. Vol. 32. No. 9. pp. 118–119. [4 refs.]

The author points out that what is known and recognized as sprue is a symptom-complex. Apart from confirmatory or mostly accessory

means there is no test diagnostic of sprue alone, and abdominal tuberculosis, pancreatitis, Addisonian anaemia, may clinically closely resemble sprue. He insists that before diagnosing autochthonous English sprue he must find in the case the typical diarrhoea, anaemia, tongue and mouth lesions, and also the characteristic response to appropriate treatment. He notes that VAN DER SCHEER (1905) recorded a typical case of sprue who had never been out of Holland; MENSE (1913) diagnosed sprue in a case in Cassel, Germany; Hess THAYSEN (1925) reported a series of cases discovered in Denmark which he described as non-tropical sprue; but [Manson-Bahr points out], these cases had small stools and no anaemia, though other characters of stools, and mouth lesions, were typical. HOLST (1927) reported a case, with cramps and tetany, in Denmark.

The author now reports a case originating in England, which he had watched for 5 years (1920-25).

The woman, aet. 28 years, suffered (1919) from vomiting, diarrhoea, loss of flesh, after birth of third child. Stools were enormous, frothy, with sour odour. When seen 1920, tongue had become very sensitive especially to salt and pepper; aphthae on lower lips, fraenum linguae and buccal mucosa; amenorrhoea for over a year; abdomen doughy, distended; skin inelastic, dry; distinct diminution of liver dullness; general appearance pinched. Stools acid, large, pasty, mostly fatty acid and crystals. Fat content 40 per cent.; free acids 23.4 per cent.; neutral fats 2 per cent.; fatty acids in form of soap 15.3 per cent. Blood—red cells 3,500,000; haemoglobin 80 per cent.; colour index 1.1; white cells, 5,600. All tests for pancreatic inefficiency negative. The late Sir James CANTLIE concurred in diagnosis of sprue. Treatment—nursing, rest, milk dietary—followed by great improvement and return to former weight. Two years later after birth of fourth child relapse and recurrence of typical symptoms—recovery on same treatment. During next two years occasional diarrhoea with aphthous ulcers in mouth. In 1924 severe relapse, stools of typical sprue, supervention of severe pernicious anaemia, and great loss of weight. No response to milk and liver soup dietary, but good recovery under Cantlie's meat dietary. No symptoms for last four years.

[The author's authority in matters of sprue adds to the value of this record of a non-tropical case of sprue. He comments that other cases may be encountered in practice in England, and may shed light on the true aetiology of sprue.]

H. M. Hanschell.

HOLMES (William H.) & STARR (Paul). **A Nutritional Disturbance in Adults resembling Celiac Disease and Sprue. Emaciation, Anemia, Tetany, Chronic Diarrhea and Malabsorption of Fat.**—*Jl. Amer. Med. Assoc.* 1929. Mar. 23. Vol. 92. No. 12. pp. 975-980. With 9 text figs. [19 refs.] [Northwestern Univ. Med. School & Med. Service of Wesley Memorial Hosp., Chicago.]

In this group of clinical cases were found an extreme degree of emaciation, severe anaemia of the macrocytic type, low blood calcium with associated sensory and motor phenomena and fatty diarrhoea, all apparently arising from malabsorption of food. For want of a better term they might be classed as non-tropical sprue, but with equal justification as chronic digestive insufficiency, or as coeliac disease of adults. After a visit to San Juan, Porto Rico, to observe tropical sprue in various stages of development, the authors found many of the symptoms and signs in their cases were similar to those of tropical sprue.

Five cases are reported.

P. H. M-B.

- i. THAYSEN (T. E. Hess). **The "Coeliac Affection"—Idiopathic Steatorrhoeas**—*Lancet*. 1929. May 25. pp. 1086–1089. With 4 text figs. [34 refs.]
- ii. SHACKLE (J. W.). **Sprue and Coeliac Disease**. [Correspondence.]—*Ibid.* June 8. p. 1224.

i. Since HERTER in 1907 rediscovered the coeliac affection in children, later authors have paid attention only to cases in children, and have forgotten that GEE observed this disease also in patients returning from India and in adults who had never been abroad. GEE did not mention stomatitis, probably because in some cases of tropical sprue it is inconspicuous or absent. In Germany and in Holland and possibly also in England, there have been reported sprue-like diseases in individuals who have never been in the tropics.

The two diseases, Gee-Herter disease and sprue, are nearly related, if not identical. The patients are markedly emaciated, their muscles are flaccid and atrophic. Other outstanding symptoms are fatty diarrhoea, meteorism, changes in mucous membrane of tongue, achylia gastrica, poor appetite and anaemia. Tetany is a frequent complication. Enteritis is more frequent in tropical sprue than in coeliac disease, though in one out of four fatal cases of the latter slight subchronic enteritis was demonstrated. SCHAAP states that the tongue in Gee-Herter disease may show similar changes to those of sprue. Thaysen believes that there are two more signs common to sprue and Gee-Herter disease, the low blood sugar curve and the abnormal basal metabolism. A low blood sugar curve—that is, with a rise of 40 mgm. per cent. or less—is considerably more frequent in sprue and Gee-Herter disease than in normal people. This abnormality subsides with recovery.

In a table are given details of non-tropical sprue and of Gee-Herter disease in children. Of 11 cases of non-tropical sprue, 4 developed before the age of 20 years and 1 in a child of 11. Among 6 cases of Gee-Herter disease 1 began at the age of 13 years and 2 at the age of 10 years. In sprue and in Gee-Herter disease, change to another climate promotes a cure. Thaysen would group sprue, non-tropical sprue and Gee-Herter disease together as "the idiopathic steatorrhoeas" in order to differentiate them from pancreatogenous, acholic, and possibly also enterogenous fatty diarrhoea.

ii. Dr. Shackle points out that in conjunction with Dr. A. C. HAMPSON (Guy's Hospital Reports, April, 1924) he demonstrated by the graphic method that the blood in sprue shows the same megalocytic changes as in Addison's anaemia. In two cases of coeliac disease no corresponding blood changes were observed.

P. H. M-B.

BEIJNEN (G. J. W. Koolemans). Een geval van tropische spruw. [**A Case of Tropical Sprue**.]—*Nederl. Tijdschr. v. Geneesk.* 1929. June 22. 73rd Year. 1st Half. No. 25. pp. 2925–2936.

This clinical lecture gives the case of a European woman of 41, who resided in the tropics for 13 years and during that time apparently suffered from bacillary as well as from amoebic dysentery. Afterwards she remained inclined to attacks of diarrhoea without any particular reason; the use of fish was sure to produce severe diarrhoea, sometimes with

vomiting. After her return to Europe, 3 years ago, the condition temporarily improved, but soon a relapse occurred which slowly led to the fully developed picture of sprue.

The differential diagnosis is made from pernicious anaemia (atypical blood picture, emaciation, absence of symptoms of the nervous system, presence of hydrochloric acid in the stomach contents) and from pancreatic disease (normal blood sugar value, absence of alimentary glycosuria), and the separate symptoms of sprue are fully discussed as well as the theories concerning its etiology.

Apparently, especially from the therapeutical direction, the author considers overburdening of the intestinal tract with carbohydrates as the principal cause of the disease. But for a great restriction of carbohydrates, no special diet is recommended. Raw food is better borne than so called light digestible foodstuffs. Rest, if possible in bed, is of great importance in all cases of any severity. The blood producing organs may be stimulated by injections with some arsenical preparation.

A long and systematic treatment is required to obtain a complete cure, which, however, is reached in most cases in 1-2 years. The gradual diminution of the fat content of the faeces is taken as a guide in allowing more carbohydrates in the diet.

W. J. Bais.

SCHERER (Else). Ein Fall von einheimischer Sprue. [**Case of Indigenous Sprue.**—*Klin. Woch.* 1929. Aug. 27. Vol. 8. No. 35. pp. 1625-1626. [2 refs.]

The patient, a lady of 45 years of age, had during the years 1924-1928, undergone a series of gynaecological operations and had suffered considerably from bronchitic symptoms. During the latter part of 1928 sprue symptoms declared themselves, the diagnosis being established by the large frothy voluminous stools, severe anaemia of hyperchromatic character, well-marked glossitis and stomatitis, diminished acidity of the gastric juice, high degree of meteorism and the appearance of tetany with diminution of the blood calcium content. The cachexia was extreme and there was a high degree of wasting. Great improvement resulted from an albuminous dietary with minced raw beef, cooked liver, two teaspoonsful of Hepatopson (Promonta), plenty of fruit and 20 drops of dilute hydrochloric acid daily. The tetanic symptoms disappeared after liberal dosage with Parathormone (Lilly) and Collip's extract of parathyroid.

The author believes that this was a case of non-tropical sprue comparable to those described by THAYSEN.

P. H. M-B.

MACKIE (F. P.) & CHITRE (G. D.). **Yeasts and Sprue.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1928. Aug. Memoir No. 11. 39 pp. With 8 plates. [34 refs.]

The authors isolated 252 strains of yeast-like fungi from faeces from cases of typical sprue, other intestinal diseases, and healthy men and animals. They studied these strains as regards fermentation powers, type of growth in fluid media and on gelatin, appearance of giant colonies, and morphology on solid media.

They found that the strains could be separated into two main classes, A and K. Class A are all maltose fermenters, and usually also ferment glucose, laevulose and galactose, and are of the type of *Monilia psilosis*

Ashford. Class K are all non-fermentors of maltose and are of the type of *Monilia kruzei* Castellani. The yeast-like fungi which are commonly regarded as pathogenic are of the A type; and saprophytic or non-pathogenic ones of the K type. The fermentation powers of these yeasts were found to be quite constant with respect to maltose, but to vary in the majority of the strains as regards other sugars when tested after long sub-culturing. Usually, after repeated sub-culturing, there was a decrease in fermentative power, which could be restored, wholly or in part, by passage through experimental animals. Another small class, M, could be separated, and included strains not fermenting maltose and never forming any mycelium, and thus being of the *Cryptococcus* type. In general, the A and K classes could be differentiated by fermentation powers, growth in fluid media, growth on gelatin and on solid Sabouraud medium, and the appearance of the giant colonies. None of the strains liquefied gelatin, and none of those tested had haemolytic properties. Cultures of yeasts or other organisms were not obtained from blood-cultures from a number of cases of typical sprue.

The *M. psilosis* type of yeasts was found in 40 per cent. of cases of sprue, and in an equal percentage of cases of other intestinal diseases, and healthy men and animals. The *M. kruzei* type of yeasts was present in about 50 per cent. of cases of sprue and other diseases, and in a smaller percentage of healthy men and animals. The distribution of the different types of yeasts is similar in sprue and other diseases, and no type is particularly frequent in either a diseased or healthy condition. Consequently, there is no evidence that any yeast has a causative relation to sprue.

P. Tate.

WEISS (Charles) & LANDRÓN (Francisco). **Immunological Investigations on Tropical Sprue in Porto Rico.**—*Amer. Jl. Trop. Med.* 1929. Mar. Vol. 9. No. 2. pp. 83-96. [22 refs.] [School of Trop. Med., Univ. of Porto Rico, & Presbyterian Hosp., San Juan, Porto Rico.]

Specimens of whole blood from a series of 20 sprue patients were compared with specimens from 20 miscellaneous hospital cases in their ability to inhibit the growth of various *Monilia*, but no evidence of a specific activity of the blood in sprue patients towards *Monilia* could be obtained.

Endotoxins were prepared from *M. psilosis*, *M. albicans* and a cryptococcus from cutaneous blastomycosis and used in skin tests on a series of 22 undoubted cases of sprue and 26 patients suffering from various medical and surgical disorders. While a majority of the sprue cases gave positive reactions to the endotoxins of *M. psilosis*, a larger percentage reacted to the toxins of *M. albicans* and the cryptococcus. In the controls about one-third reacted to all three toxins.

Attempts to transmit sprue to three human subjects and to three ring-tailed monkeys by rubbing into their tongues scrapings obtained from the inflamed tongue of a sprue patient, were unsuccessful. Attempts at producing the disease by injecting *Monilia* into the skin of human volunteers and into the tongue and peritoneum of monkeys were similarly negative.

P. H. M-B.

FAIRLEY (N. Hamilton) & JASUDASAN (F.). **An Investigation of the Value of the Complement Reaction in Sprue utilizing *Monilia psilosis* (Ashfordi) as Antigen.**—*Indian Jl. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 861–869. [22 refs.] [Haffkine Inst., Bombay.]

Rabbits inoculated intravenously with saline suspensions of *Monilia psilosis* yield sera of high grade titre when tested *in vitro* by means of the complement fixation reaction using aqueous extracts of the *Monilia* as antigen. The sera of 12 out of 14 inoculated rabbits fixed from 15–24 minimum haemolytic doses of complement some 10–32 days after the first injection, while the sera of the other two fixed 5 minimum haemolytic doses. Identical antigens when tested against human sera derived from sprue patients failed to show positive reactions in 15 out of 17 cases tested. No confirmation of the claims of ASHFORD, MARTINEZ and MICHEL was therefore forthcoming. P. H. M-B.

THAYSEN (T. E. Hess) & NORGAARD (A.). **The Regulation of Blood Sugar in Idiopathic Steatorrhea (Sprue and Gee-Herter's Disease). I. The Low Blood Sugar Curve.**—*Arch. Intern. Med.* 1929. July. Vol. 44. No. 1. pp. 17–28. With 6 charts. [18 refs.] [St. Elizabeth Hosp., Copenhagen.]

The low blood-sugar curve is most frequently present in the idiopathic steatorrheas. The blood sugar was determined by the method of Hagedorn and Norman-Jensen; the amount of dextrose ingested was usually 60 gm. Blood was withdrawn every ten minutes, as frequent estimations are necessary in determining the rise of the curve. As is well-known, the blood sugar curve varies considerably in normal persons and this variation follows the ordinary curve of error. According to their calculations the low curve defined as a curve with a rise of 40 mgm. per 100 cc. or less is encountered in 5 per cent. of normal persons.

In the group of diseases which the authors designate "idiopathic steatorrheas" they include (1) tropical sprue, (2) non-tropical sprue, and (3) "the coeliac affections" of GEE (1888), later described by HERTER as "intestinal infantilism." The blood sugar curve is low in all these diseases as the authors of this paper were the first to point out. Whereas one may expect a low curve in about 5 per cent. of normal persons, they found such a curve in 50 per cent. of sufferers from idiopathic steatorrhea.

The authors attach considerable importance to the rise of the blood sugar curve as a diagnostic aid in the classification of the diseases coming under the heading of chronic steatorrhea. In the pancreatic form a diabetic curve occurs as the result of a lowered function of the pancreatic islands. In alcoholic steatorrhea the curve is either normal, or shows a marked rise followed by a fall to hypoglycemic values.

Tetany is a rather frequent phenomenon in idiopathic steatorrhea as was demonstrated in six of the thirteen patients. P. H. M-B.

KASSIRSKY (J. A.). Ueber den Grundumsatz bei der Sprue. [**Basal Metabolism in Sprue.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. May. Vol. 33. No. 5. pp. 283–287.

Kassirsky's investigations have led him to believe that in sprue we are dealing, not with a localized affection of the intestinal tract, but

with some general disturbance of metabolism. Nothing accurate is so far known about basal metabolism in this disease.

The widespread pathological changes, especially those of the blood-forming organs, the marked hyperchromic anaemia, the changes in the viscera, achylia in combination with the most severe enteritis, the exhaustion in association with acidosis, all contribute towards great alterations in the general rate of metabolism. In general, there is a rise of the metabolic rate. The Knipping method of estimating the rate has been employed. There were, however, three exceptional cases in which a fall was registered. Two of these were in the convalescent state, while the third was very mild.

It is noteworthy that peculiarly chronic cases with severe anaemia and emaciation tend to show a rise in the basal metabolic rate. In the first place there is a great reduction in the absorption of nutritious material owing to the disturbance of digestive processes in the intestinal canal. In true starvation it has been proved that a fall in the rate of metabolism takes place. In severe cases of sprue emaciation is a constant factor, and there is an intensive destruction of albumen. The second factor which must influence the metabolic rate in sprue is the anaemia which is one of the cardinal symptoms of the disease. It is generally agreed that a rise of metabolism accompanies anaemia, whether hyperchromatic or hypochromatic. It is probably an over compensation of the organism which leads to an excess of oxygen absorption—as is seen after a severe haemorrhage.

Lastly, the influence of "acidosis" on the metabolic rate is discussed and the conclusion reached is that no importance can be attached to this condition.

For comparison this investigator has studied five cases of uncomplicated enteritis and three cases of pellagra with sprue-like phenomena without finding any disturbance of basal metabolism.

The table accompanying this article should be studied.

P. H. M-B.

ASHFORD (Bailey K.). **Mycology of Intestinal Canal in Porto Rico and its Relation to Tropical Sprue.**—*Jl. Amer. Med. Assoc.* 1929, Sept. 7. Vol. 93. No. 10. pp. 762-765. With 4 text figs. [1 ref.]

— La mycologie du canal intestinal à Porto-Rico et ses relations avec la sprue tropicale.—*Bull. Soc. Path. Exot.* 1929. Feb. 13. Vol. 22. No. 2. pp. 58-60.

The object of this study (which has been continued since November, 1924) has been to classify the common fungi of the intestinal tract in Porto Rico and to establish the relative frequency of *Monilia psilosis* in the normal bowel and in that of sufferers from tropical sprue. Data have been assembled from the culture of 872 cases, 280 of whom had clinical sprue, 288 were sufferers from nutritional unbalance, 126 from various other diseases, whilst 178 were healthy boys from a charity school in San Juan. Exclusive of the latter group, 1,201 cultures were made from the faeces of 694 sick persons. Of these 420, or 36.9 per cent., were negative for fungi. A more intensive study was made of all fungi recovered in the last 184 cases of this series. Of these 52.7 per cent. were positive for *Monilia psilosis*. The total number of specimens of faeces grown in culture was 210; of these 17.6 per cent.

were negative. With the exception of unclassifiable fungi, 95.3 per cent. of the fungi in the intestinal canal in Porto Rico fall into five genera and about one dozen species. The author's present view as to the causation of sprue is stated as an infection grafted onto the syndrome of nutritional unbalance. Exhaustion, both physical and mental, are predisposing factors, for sprue is pre-eminently an exhaustion process. Into the sweet, fermenting acid bowel is sown the omnipresent *Monilia psilosis* and there in its preferred medium it colonizes, instead of passing out, as in health it seems to do, without effecting any serious foothold. The following conclusions may be reached :—

" 1. *Monilia psilosis* is a pathogen ; if it is not, then neither is *Monilia albicans*.

" 2. *Monilia psilosis* abounds in the intestinal canal of the patient with sprue until, in the cachectic forms of the disease, the reaction of the bowel becomes radically changed, or the intake of improper food is checked, often too late for digestive glands that have finally become impotent.

" 3. *Monilia psilosis* tends to pass from one to another of the same family who eat the same food and are suffering from the same food unbalance.

" 4. Sprue relapses in northern countries, where it is practically unknown, after long periods of a corrected dietary, or, indeed, may even develop for the first time months or years after the subject has left the tropics.

" 5. Even in certain tropical countries of large extent, where probably a number of cases of a similar syndrome of food unbalance exists, sprue seems to be at least a rare disease."

P. H. M-B.

WEISS (Charles), LANDRON (Francisco), COSTA-MANDRY (Oscar) & WILKES-WEISS (Dorothy). **Summary of Investigations on the Etiology of Tropical Sprue in Porto Rico.**—*Ann. Intern. Med.* Ann Arbor, 1929. May. Vol 2. No. 11. pp. 1198-1208. With 1 map. [15 refs.]

All the results recorded in this paper have already been reviewed in this *Bulletin*.

P. H. M-B.

REVIEWS AND NOTICES.

COCHRANE (Robert G.) [M.D., Ch.B., M.R.C.P., D.T.M. & H., Secretary, British Empire Leprosy Relief Association, Hon. Medical Adviser, Mission to Lepers]. **Leprosy: Symptoms, Diagnosis, Treatment and Prevention.** With Foreword by Major-General Sir Leonard Rogers, M.D., F.R. C.P., F.R.C.S., F.R.S., I.M.S. (ret'd.). 2nd (Revised) Edition.—68 pp. British Empire Leprosy Relief Association, 29 Dorset Square, London, N.W. 1. [2s.]

Dr. Robert Cochrane is the Secretary to the British Empire Leprosy Relief Association. His brochure, therefore, bears the stamp of authority.

The present edition, revised and enlarged, sets out in concise form the results of a close study and a practical experience of the disease in various oriental endemic centres. The importance of such a handbook is emphasized by Sir Leonard Rogers, who very wisely states in the preface that "it is easy to do more harm than good by over-active treatment, so clear guidance in the use of new remedies is required by the numerous men and women now engaged in the great effort to reduce and eventually eradicate leprosy from our scattered tropical and sub-tropical possessions."

The first portion of the work (pp. 5-25), dealing as it does with symptomatology, diagnosis, and prognosis, is probably too much abridged to be of practical assistance to anyone unacquainted with the disease; it should be regarded rather as an *aide-memoire* to leprologists of experience.

In the second and major section (pp. 26-59) the author discusses in considerable detail some of the modern therapeutic measures employed, with particular reference to the exhibition of (1) hydnocarpus oil and its derivatives, (2) iodides, and (3) protein injections. The general treatment of the patient is very briefly touched upon, and "Fresh Air" is dealt with in five lines. It seems unfortunate that the principles taught by BEAUFERTHUY and practised by him with such success in the West Indies about seventy years ago should receive such scant attention from modern writers on leprosy.

As a practical guide, the book is somewhat marred by a tendency to looseness of expression and by other evidences of haste in its preparation. For example, on page 61, a reader might understand the phrase "after 1 per cent. hours," but he would have difficulty with the interpretation of the following: "Medicinal reaction in leprosy is equivalent to a dose of an autogenous vaccine, and by the S.I. [Sedimentation Index] we can gauge to a nicety the amount of vaccine generated by a drug like Potass: Iodide." On page 46, SHARP's method of producing protein shock is "to inject 0.5 cc. of sterile tinned Milkmaid brand or Ideal milk diluted with nine parts of distilled water." How can the beginner be certain whether he is to inject 0.5 or 5.0 cc. of the diluted milk?

The above are only a few examples of the errors of composition which call for a further revision of the work, and they are specifically quoted in the hope that Dr. Cochrane will take an early opportunity of removing the weak points from an otherwise useful and authoritative brochure.

J. Anderson.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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MEDICAL ZOOLOGY.

KELLAWAY (Charles H.) & EADES (T.). **Field Notes on the Common Australian Venomous Snakes.**—*Med. Jl. Australia.* 1929. Aug. 24. 16th Year. Vol. 2. No. 8. pp. 249–257. With 1 text fig. & 18 figs. on 4 plates.

This is an instructive lesson, well illustrated by figures, in the identification of the venomous land snakes, and particularly of the six commonest and deadliest species, of Australia, the authors emphasizing the fact that for the proper treatment of snake-bite it is essential that the snake that inflicted the bite should be accurately identified. The six species are the Tiger snake (*Notechis scutatus*), the Death adder (*Acanthophis antarcticus*), the Copperhead (*Denisonia superba*), the Black snake (*Pseudechis porphyriacus*), and two species of Brown snakes (*Diemenia textilis* and *D. nuchalis*). In each case, besides the technical specific diagnosis upon which exact identification depends, the size and general appearance, the habitat, the habits and mode of life and behaviour, and the details of the distribution of the species are given. There are many other species of venomous snakes in Australia, the authors estimate the number, including the venomous sea-snakes, as about 100, and give a few words to some of them, as well as a key to genera.

A. Alcock.

KELLAWAY (C. H.). **Observations on the certainly Lethal Dose of the Venom of the Death Adder (*Acanthophis [sic] antarcticus*) for the Common Laboratory Animals.**—*Med. Jl. Australia.* 1929. June 8. 16th Year. Vol. 1. No. 23. pp. 764–772. With 2 graphs in text. [6 refs.] [Walter & Eliza Hall Inst., Melbourne.]

This paper gives in full detail the effects, as observed in symptoms and post-mortem observations, of the venom of the Australian Death adder (*Acanthophis antarcticus*) on horses, monkeys, cats, rabbits, guinea-pigs, rats, and mice. The experiments confirm those of previous observers as to the highly toxic character of the venom and its comprehensive neurotoxic, haemorrhagic, and haemolytic properties. It is not coagulant, but, on the contrary, exhibits a feeble anticoagulant action. The subcutaneous certainly lethal dose of the venom for the different species of animals in experiment lay between 0.025 and 0.7 mgm. per kilogram of bodyweight, and the subcutaneous-intravenous index varied from 2.5 to about unity.

A. A.

KELLAWAY (C. H.). **The Action of the Venoms of the Copper-Head (*Denisonia superba*) and of the Death Adder (*Acanthophis antarcticus*) on the Coagulation of the Blood.**—*Med. Jl. Australia*. 1929. June 8. 16th Year. Vol. 1. No. 23. pp. 772-781. [19 refs.] [Walter & Eliza Hall Inst., Melbourne.]

This interesting paper starts with a review of previous work on coagulant venoms—venoms characteristic of vipers, but otherwise known only in a few elapines (and those Australian), which when injected intra-venim in sufficient doses cause intravascular coagulation. The experiments here fully described show that the venoms of *Denisonia superba* and *Acanthophis antarcticus* even in large doses have no coagulant action *in vivo* in birds and mammals, though they have a feeble coagulant action in high concentrations on avian and mammalian plasma *in vitro*; that with Lamb's technique (using citrated and oxalated plasma) both these venoms have also a feeble anticoagulant action on mammalian plasma *in vitro*, an anticoagulant activity that is not destroyed, but rather is enhanced by heating; and that (in preliminary experiments) both venoms, when permitted to act in high concentrations on mammalian plasma *in vitro*, impair its subsequent reaction with coagulant venoms.

A. A.

KELLAWAY (C. H.) & WILLIAMS (F. Eleanor). **The Venoms of *Oxyuranus maclennani* and of *Pseudechis scutellatus*.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1929. Sept. 16. Vol. 6. Pt. 3. pp. 155-174. With 5 text figs. [8 refs.] [Walter & Eliza Hall Inst., Melbourne.]

This paper contains the details of a careful experimental study of the venoms of two species of Australian Elapine snakes—*Oxyuranus maclennani* and a species presumed to be *Pseudechis scutellatus*. [It is interesting to note as another authentic illustration of the fact that preserved snake-venoms keep their virulence that the samples of venom here studied had been collected in the field several years before.] The important facts are, respecting the *Oxyuranus* venom, that it is lethal to rabbits in subcutaneous doses of the order of 0.5 mgm. and in intravenous doses of 0.1 mgm. per kilo of bodyweight, that it is powerfully neurotoxic and causes death by failure of respiration, that it contains thrombase and causes intravascular clotting when injected in sufficient dosage, and that it is feebly haemolytic. The venom of the species presumed to be *Pseudechis scutellatus* is lethal to rabbits in subcutaneous doses of the order of 2 to 3 mgm. and in intravenous doses of about 0.7 mgm. per kilo of bodyweight, and it is feebly neurotoxic but powerfully anticoagulant and haemolytic. Both venoms have a stimulant action on isolated plain muscle.

A. A.

KELLAWAY (C. H.). **The Action of Australian Snake Venoms on Plain Muscle.**—*Brit. Jl. Exper. Path.* 1929. Oct. Vol. 10. No. 5. pp. 281-303. With 9 text figs. [11 refs.] [Walter & Eliza Hall Inst., Melbourne.]

The venoms of certain Australian Elapine snakes studied by the author have a powerful stimulant action upon plain muscle *in vitro* of a type which the author thinks to have not been described before, either for snake-venoms or for any other substance. The species so far tested give in various concentrations the reaction described: *Notechis scutatus* (tiger snake), *Acanthophis antarcticus* (death adder),

Denisonia superba (copperhead), *Pseudechis porphyriacus* and *guttatus*, *Oxyuranus maclennani*, *Diemenia textilis*.

The following are the author's conclusions :—

" 1. All the Australian elapine venoms tested have a stimulant action upon isolated plain muscle.

" 2. The type of action resembles the anaphylactic reaction of the isolated plain muscle of the guineapig in its latent period, and in the ease with which the muscle is desensitized by the venoms of this group.

" 3. The Australian venoms produce the reaction in varying concentrations. After reaction to one venom the plain muscle is insensitive to equivalent doses of the other venoms in the group.

" 4. The muscle after desensitization does not recover its sensitiveness to snake venom, but its reactions to other stimuli are unimpaired.

" 5. The plain muscle of guineapigs sensitized by the injection of egg albumin, after desensitization with snake venom, retains unimpaired its sensitiveness to its specific anaphylactic antigen. After desensitization with egg albumin the muscle appears to be somewhat less sensitive to snake venom.

" 6. Experiments with ergotoxin suggest that the effect of the venoms is a direct one upon the plain muscle.

" 7. The venoms cause contraction of the isolated uterus of the rat, and the reaction of the plain muscle of the guineapig and rabbit is therefore not due to the production of histamine, since this drug causes relaxation, not contraction, in the uterus of the rat.

" 8. The reaction differs from that caused by the toxin of *Vibrio septique*, and after desensitization with snake venoms a good reaction can be obtained with this toxin.

" 9. The behaviour of the only two other venoms tested (those of *Naia tripudians* and *Vipera russelli*) is quantitatively widely different from those of the Australian elapines.

" 10. The stimulant principle in the Australian venoms is moderately thermo-labile, and is destroyed at 92°–94° C. at about the same rate as the neurotoxic principle.

" 11. Like the neurotoxic principle, it appears to reside in the proteose fraction of the venom.

" 12. At pressures of 300 to 400 mm. of mercury, and during a period of some hours, it only passes with difficulty through pyroxylin filters permeable to erythro-dextrins but not to egg albumin or haemoglobin.

" 13. The stimulant principle is neutralized by antivenine, but the results obtained by titration, using the isolated plain muscle, are quantitatively widely different from those obtained by subcutaneous injection in guineapigs.

" 14. Death-adder and tiger-snake antivenines give some protection against Australian venoms other than those against which they are prepared, and non-specificity of the same order is observed in tests with the isolated plain muscle."

A. A.

MACPHERSON (John). **The Largest Venomous Australian Snake.** [Correspondence.]—*Med. Jl. Australia*. 1929. May 4. 16th Year. Vol. 1. No. 18. p. 609.

Mentions, by the name *Oxyuranus maclennani*, two venomous snakes, 9 feet 2½ inches and 8 feet 6 inches long respectively, killed in Cape York peninsula, and refers to another venomous snake, *Demansia* [*? Diemenia*] *guttata*, over 9 feet long, killed in the Northern Territory.

A. A.

VELLARD (J.). Ações phylacticas não específicas em relação aos venenos ophidicos. Tratamento auxiliar dos accidentes ophidicos. [Specific Drugs in the Auxiliary Treatment of Snake-Bite.]—*Inst. Oswaldo Cruz, Suplemento das Memorias*. 1929. July 31. No. 9. pp. 156–165. French summary p. 166. [23 refs.]

The author has experimented with the effect of various drugs upon the venom of certain snakes. In one series of experiments he injected the drug with the venom after they had been in contact together for some time up to an hour, and in another series he injected the venom an hour *after* the injection of the drug. In the latter series of experiments, using the venom of *Crotalus terrificus* 0.002 mgm., of *Lachesis jaracara* 0.10 mgm., and of Cobra 0.10 mgm., he got the following results: Spartein 15 mgm. was completely protective against *Crotalus terrificus* and alleviative of the symptoms of the cobra venom; strychnin .04 mgm. completely protective against *Lachesis jaracara*; adrenalin .05 mgm. completely protective against *L. jaracara* and cobra, and alleviative of *C. terrificus*; pilocarpine 20 mgm. completely protective against cobra; cafein 20 mgm. completely protective against *jaracara* and cobra; manganese chloride completely protective against cobra. Morphin, atropin, cocain, digitalin, oil of camphor, and alcohol had no protective effect. From the practical standpoint, the author thinks that the drugs shown to have a protective action may have a subordinate value in the treatment of snake-bite.

A. A.

CLARK (H. C.). Abstracts of Snake-Bite Cases. Central American Divisions—United Fruit Company, 1928.—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 271–287.

——. Snakes from the Chiriqui Land Company.—*Ibid.* pp. 288–289.

——. *Bothrops nummifera* in Honduras.—*Ibid.* pp. 289–291. With 2 figs.

i. These brief abstracts, though of local value as a record, are not of wide general interest, since in more than half of the 46 cases the snake was either not caught at all or not identified. In 12 cases the species was identified as *Lachesis atrox* ("barba amarilla," or "fer de lance"), in 2 cases as *L. schlegelii*, and in 1 as *L. mutus* (bushmaster). Five cases were fatal—1 *atrox*, 1 *mutus*, and 3 unidentified. It may be of interest to know that, where the site of the bite is recorded, 20 bites were on hand or finger, 6 on wrist or forearm, 1 on shoulder, 10 on foot or toe, 2 on leg, and 1 on thigh.

ii. Of 78 snakes collected in Chiriqui territory (western extremity of Panama) 52 were *Lachesis atrox* (fer de lance), 7 were *L. schlegelii* (horned palm-viper), 1 was *L. mutus* (bushmaster), and 1 was a coral snake (*Elaps nigrocinctus*)—the rest being non-poisonous though supposed by the collectors to be poisonous.

iii. *Lachesis nummifer* (= *Bothrops nummifera*) is known in the vernacular of Honduras as *mano de piedra* and *timbo*.

A. A.

- JACKSON (Dudley). **Treatment of Snake Bite.**—*Southern Med. Jl.* 1929. July. Vol. 22. No. 7. pp. 605–607.
- CRIMMINS (M. L.). **Poisonous Snakes and the Antivenin Treatment.**—*Ibid.* pp. 603–605.

These two papers are concerned with the venomous snakes of the United States of America—which, but for two apparently scarce species of coral snakes (Elaps). are all Crotaline vipers. The papers will be instructive for the local readers, but contain nothing for those who are familiar with the classical work of the great American physiologist Weir MITCHELL on snake-venoms and of his successors in France, India, Australia, and South America.

A. A.

- TAYLOR (K. P. A.). **Apparent Cure of Purpura Haemorrhagica with Bothropic Antivenin.**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 194–196. [United Fruit Co. Hosp., Quirigua, Guatemala.]

The patient here was a white man, age 21, who had been ill for 7 days, with a high temperature and a diagnosis of fulminating typhoid fever, or alternatively “grippe”; on the 4th day severe epistaxis, unrelieved by horse-serum, calcium chloride, and ergotin, had necessitated fore and aft tamponage of nares. When admitted to hospital bleeding from nostrils and gums was abundant, and besides numerous purpuric patches at the sites of cuppings and hypodermic injections there was one spontaneous purpuric patch to establish the diagnosis of haemorrhagic purpura; subsequently there was vomiting of blood, haematuria, and bleeding from the bowels, and since drugs, including adrenalin, had no effect, transfusion of blood seemed to be the only means of saving life. During preparations for the operation Dr. H. C. CLARK suggested bothropic antivenin, and 10 cc. were injected into a muscle. “Clinical cure was nearly instantaneous;” within 2 hours the epistaxis, which at one time had been “spectacular,” had stopped; and the patient was discharged on the 13th day after the beginning of his illness. Two weeks later the patient, as the result of a gunshot, had to have a toe amputated and the operation was done without any unusual bleeding. He was under observation for about 20 days after the operation.

A. A.

- BUDDLE (R.). **Poisonous Snakes found at the Singapore Base.**—*Jl. Roy. Nav. Med. Serv.* 1929. Oct. Vol. 15. No. 4. pp. 280–289. With 3 text figs.

This useful paper is intended for naval medical officers on the China Station who are likely to be calling at Singapore and are not likely to be provided with standard treatises on snakes and specific treatment of snake-bite. The local poisonous species described and instructively discussed are the common oriental Cobra, the King Cobra, the banded Krait (*Bungarus fasciatus*), the “coral” snakes *Doliophis bivirgatus* and *D. intestinalis*, and the pit-vipers *Lachesis purpureomaculatus* and *L. wagleri*. The author thinks that the local cobra is not as deadly as its Indian match. [The impression that individuals of the selfsame species, notoriously deadly in India, are much less virulent in the more generally humid climate of Further India is not at all new; but, so far as the reviewer is aware, it has never been subjected to conclusive tests.]

A. A.

NICHOLLS (Lucius). **The Identification of the Land Snakes of Ceylon.**—*Ceylon Jt. Sci.* (Sect. D. Med. Sci.) 1929. Oct. 28. Vol. 2. Pt. 3. pp. 91–157. With 12 plates.

Here are alternative schemes for the specific identification of the land snakes of Ceylon without reference to skeletal (cranial) characters or main stress on dentition: one of them is based chiefly upon colour-markings and general appearance; the other chiefly upon disposition of scales and shields.

A. A.

KOPSTEIN (F.). **Observations on the Venomous Effect of *Naja bungarus*.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 2. pp. 304–309. With 1 text fig.

—. **Waarnemingen over de gifwerking van *Naja Bungarus*.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. June 10. Vol. 69. No. 6. pp. 559–564. With 1 text fig.

This is an interesting story of a snake-charmer who took his pet snake, a king cobra (*Naja bungarus*), to the river for a bath and got bitten in the wrist. By report he died in convulsions three-quarters of an hour afterwards. The author quotes several cases recorded in British India, where death followed even more rapidly. The author describes the snake as an obviously starved specimen. Both fangs were intact, the left venom-gland was dry, but the right yielded about one-third of a cubic centimetre of venom when milked. This venom was diluted with 4 times its volume of glycerine, and 0.5 cc. of the mixture was injected at the root of the tail of a full-grown *Macacus cynomolgus*. The animal showed the usual symptoms of gradually increasing drowsiness and paralysis, and expired in asphyxic convulsions in 26 minutes. "Some drops" of the mixture injected into a hen were fatal in 6 minutes. To doses of 0.2 cc. of the mixture a tortoise succumbed in an hour and a half and two freshwater snakes in 8 hours.

A. A.

FRASER (Laurence). **A Case of Snake-Bite in Cyprus.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. p. 315.

The snake in this case was *Vipera lebetina*, and the victim was bitten on the forehead when stooping to drink from a pool. Seen eight hours afterwards, the man was semi-conscious but in great pain, and there was much local oedema, extending to the face and neck and chest, occluding the eyes and obstructing speech and deglutition. At night he was delirious. Next day the only trouble noted is much hawking of mucus and blood for eight hours. On the third day there was ecchymosis of the eyelids and throat and on the abdomen and penis, but the eyes were freed, as also was speech and swallowing. The bite was treated by incision and dry KMnO_4 , and the patient by strychnine, adrenalin, oil of camphor, and rectal injection of saline solution. The local wounds healed slowly, but without suppuration, and the patient was discharged on the 12th day.

A. A.

OTTO (R.). **Untersuchungen ueber die Wirkung verschiedener Schlangengift-Antisera auf das Berus-Kreuzottern-Toxin.** [**Observations on the Efficacy of Different Antivenenes against the Venom of *Vipera berus*.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1929. Oct. 12. Vol. 110. No. 3. pp. 513–515. [1 ref.] [Robert Koch Inst., Berlin.]

This is another confirmation of the discovery of KRAUS and MORITSCH that certain anticrotaline serums of the Butantan (Brazil) Institute neutralize the venom of the European *Vipera aspis*, and it also confirms the author's observation that the Butantan polytropic antiophidic serum neutralizes the venom of *Vipera berus*, although coming something short of the ER serum of the Pasteur Institute in this respect.

A. A.

VELLARD (J.). Toxicité des venins ophidiqes par voie nasale. [**Toxicity of Snake Venom by Nasal Way.**—*C.R. Soc. Biol.* 1929. Nov. 4. Vol. 102. No. 28. pp. 418-419. [Bios Inst., Nictheroy, Brazil.]

Summaries of experiments on the application of venom of *Crotalus terrificus* and of *Lachesis jaracara* to the intact nasal mucosa of guineapigs, and demonstrating the mortal results.

A. A.

VELLARD (J.) & DE ASSIS (A.). Immunologische Untersuchungen ueber das Gift brasilianischer Anurenarten. [**Immunological Investigations on the Venom of Brazilian Anura.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 63. No. 1/2. pp. 116-138. [31 refs.] [Vital Brazil Inst., Nictheroy.]

This is a paper for the specialist. The authors have investigated the venomous cutaneous secretions of some South American tree-frogs and toads, and find that in only two free-frogs, namely, *Phyllomedusa burmeisteri* and *Trachycephalus nigromaculatus* is it haemolytic. The details of the paper are concerned with the effects of the venom on the red cells of sheep, and with antigens and complement-fixation properties.

A. A.

VELLARD (J.). Propriétés des sécrétions cutanées de quelques rainettes des environs de Rio de Janeiro. [**Properties of Skin Secretion of Tree Frogs at Rio de Janeiro.**—*C.R. Acad. Sci.* 1929. Apr. 15. Vol. 188. No. 16. pp. 1064-1066.

This paper gives a full account of the venomous secretions of the skin-glands of three species of the tree frogs (Hylidae) of Brazil. The secretion is easily obtained by shaking up the little animals in a little distilled water or normal saline. That of *Hyla albomarginata* is toxic to pigeons, causing general muscular convulsions and opisthotonos, from which the birds always recover. That of *Trachycephalus nigromaculatus* and that of *Phyllomedusa burmeisteri* are highly toxic to all classes of land vertebrates, as also is the parotid secretion of the latter species, all being both neurotoxic and haemolytic. The particular symptoms and post-mortem appearances are described at some length.

A. A.

PAWLOWSKY (E. N.) & STEIN (A. K.). Experimentelle Untersuchung ueber die Wirkung des Actiniengiftes (*Actinia equina*) auf die Menschenhaut. [**Experimental Observation of the Effect of Sea-Anemone Venom on the Skin.**—*Arch. f. Dermat. u. Syph.* 1929. May 20. Vol. 157. No. 3. pp. 647-656. With 5 text figs. [Numerous refs.] [Military Med. Acad., Leningrad.]

The authors describe, with assiduous attention to minute detail and with numerous text-figures, the nettle-cells and the ectodermal glands of the sea-anemone and their pathological effects upon the skin—local inflammation, oedema, extravasation and infiltration. They also give abstracts of numerous experiments illustrating the clinical effects.

A. A.

DUHIG (J. V.). The Nature of the Venom of "*Synanceja horrida*" (the Stonefish).—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 62. No. 3/4. pp. 185-189. With 2 text figs. [7 refs.]

The venom of *Synanceia horrida*—a well-known Scorpaenoid fish in warm seas, usually on rocky bottoms—is secreted in cutaneous sacks attached to the spines of the dorsal fin. It is neurotoxic and haemolytic ;

in the author's experiments 0.03 mgm. injected subcutaneously into 300 gm. guineapigs caused paralysis of the diaphragm and legs; and 0.047 mgm. completely haemolysed 0.2 cc. of a 3 per cent. emulsion of guineapig cells in an hour, at 37° C.

A. A.

- i. TROISE (E.). Action du venin de l'Araignée *Latrodectus mactans*. [**Action of the Venom of the Spider *Latrodectus* [sic] *mactans***].—*C.R. Soc. Biol.* 1929. Vol. 102. No. 36. pp. 1097–1098. [1 ref.]
- ii ——. Spécificité du sérum anti-*Latrodectus mactans*. [**Specificity of Anti-*Latrodectus* [sic] *mactans* Serum.**].—*Ibid.* 1098–1099. [1 ref.]

i. This rather scrappy paper is confirmatory of and supplementary to the author's earlier paper noticed in this *Bulletin*, Vol. 26, p. 278. One of the most characteristic symptoms produced in experimental animals by *Lathrodectes mactans* venom is a state of general convulsive tremor, which is exaggerated by dividing the medulla.

ii. The author has prepared a protective anti-Lathrodectes serum, and has proved its efficacy against Lathrodectes venom. He has also experimented with its action on the venoms of two other species of spiders, namely, *Lycosa raptoria* and *Ctenus nigriventer*. The *Lycosa* venom causes only a local reaction. The *Ctenus* venom injected into the peritoneum causes dangerous symptoms. He finds that Lathrodectes anti-serum is not protective against the venoms of these other two species, and, vice versa, that neither anti-Lycosa serum nor anti-Ctenus serum neutralize the venom of Lathrodectes.

A. A.

BELLINI (Enzo). Sull'avvelenamento da morso di vipera.—*Policlinico. Sez. Prat.* 1930. Feb. 3. Vol. 37. No. 5. pp. 177–180.

LABORATORY REPORTS.

GOLD COAST. **Annual Report of the Medical Research Institute, Gold Coast, from 1st April, 1927, to 31st March, 1928** [RUSSELL (H. M.)].—*Gold Coast Rep. on Med. & San. Dept. for Year Apr., 1927 to Mar., 1928*. IX. Scientific pp. 46–57. With 3 figs. on 1 plate.

This report relates to the laboratories at Accra and Sekondi. During the official year 1927–28 the Accra institution co-operated with members of the Rockefeller Commission in studying the histology of experimental yellow fever in *Macacus rhesus*; hundreds of animals were used and over 1,000 sections examined, and the work was still proceeding at the end of the year. Sixteen (3 doubtful) cases of yellow fever came to post-mortem examination; leptospira was not found in any of them. Work on plague included vaccine tests on *Cricetomys gambianus*, search for variants of *Past. pestis*, and experiments on a previously observed loss of virulence in passage through partially immunized animals. Contrary to earlier experience, strains that had been in culture for six months or more were found to have become much attenuated; by a single passage through *C. gambianus* virulence was restored fully for that species, considerably for *rattus*, but not appreciably for guineapigs, and all attempts to enhance virulence for guineapigs by successive passage failed. In respect of variants of *Past. pestis*, distinct differences in the appearance of colonies were observed, but they bore no relation to salt stability or virulence. Of experiments planned to produce attenuation of virulence by passage through vaccinated animals, two were successful, and confirmed the results reported last year. In 107 post-mortem examinations 26 neoplasms were examined, of which 16 were malignant (4 carcinoma, 12 sarcoma). The usual statistics of examinations of faeces, blood, etc., and of cognate routine are recorded. *Past. pestis* was not found in any of the 1,279 rodents examined. Among examinations of animals attention is directed to a newly imported polo pony with trypanosomes in the blood, a dog similarly affected, a positive diagnosis of anthrax in a cow, numerous cattle dying in Labadi district and showing blood-films positive for Babesia, and a plague-like septicaemia in *Cricetomys gambianus*. The report from Sekondi gives the routine statistics without particular comment. The report of the Medical Entomologist gives some preliminary details of a tsetse-fly survey of cattle-routes.

A. Alcock.

ANNALES DE LA SOCIÉTÉ BELGE DE MÉDECINE TROPICALE. 1928. Dec. Vol. 8. No. 3. pp. 251–272.—Rapport sur le fonctionnement du Laboratoire de Léopoldville et des services annexes pendant l'année 1927. [**Leopoldville Laboratory Report for 1927.**]

The chief point of interest here is the annual record of the results of treatment of trypanosomiasis in man with tryponarsil, Hoechst 2754, and Fourneau 270.

Tryponarsil, which is prepared by the Brussels firm of Meurice, is described as an odourless, white, crystalline powder with the same formula and constitution as tryparsamide. It is easily soluble in water,

and it keeps well in the tropics if isolated and protected from heat, sunlight, and damp. Solutions should be made at the moment of use, and any solution that is not clear should not be used. It is said to be remarkably penetrative in its action upon the nervous system, as indicated by the cerebrospinal fluid, and also to act as a stimulant; and it is quickly eliminated. The usual dose for an adult is 2 gm. a week, up to a total of 50–100 gm. for a course. The present record relates to 149 chronic cases where the drug was given intravenim in amounts per individual case ranging from 20 to 122 gm. Of these cases, in 77 the cerebrospinal fluid became quite normal, with a corresponding clinical improvement; in 36 the leucocyte rate became normal, but the albumin remained in excess; and in 22 the leucocyte rate to some extent diminished. (The local standard for a normal cerebrospinal fluid is a leucocytia below 5 leucocytes per cmm. of fluid and an albumin rate not exceeding 25 cgm. per litre.) On the other hand, 12 of the 149 cases succumbed to trypanosomiasis during treatment with tryponarsil, and in two cases treatment was interrupted by the super-vention of visual troubles.

Treatment with Hoechst 2754 has been continued. Eleven chronic cases which received individual doses varying from 18 to 42.5 gm. are here reported. Two were cured, lymphocytosis was diminished in six, two died, and one escaped observation.

Further trial of Fournau 270 shows it to be fully as trypanocidal and as penetrative as tryparsamide and tryponarsil. Of fourteen chronic cases treated, seven were cured, the leucocyte and albumin rates of the cerebrospinal fluid returning to normal. The total amounts given individually in these successful cases varied from 22.5 gm. to 56 gm. in weekly injections, usually of 1.5 gm. increased in two cases to 2 gm. A great reduction of leucocytosis and albumin occurred in another case after 48 gm. In two other cases visual troubles occurred after 4.5 gm. and 11.5 gm. respectively. One case died.

The reporters observe of plasmochin that it dispels all phases of *Plasmodium malariae* from the blood, and also the crescents, but has no effect upon the schizonts of *P. falciparum*.

A. A.

ANNALES DE LA SOCIÉTÉ BELGE DE MÉDECINE TROPICALE. 1929. June 30. Vol. 9. No. 2. pp. 123–157. With 2 figs. [6 refs.] —Rapport sur le fonctionnement du laboratoire de Léopoldville-Ouest et des services annexes pendant l'année 1928. [**Work of the Leopoldville Laboratory in 1928.**]

The report contains the usual statistics. In the anti-trypanosomiasis campaign 10,720 persons were examined; and in the trypanosomiasis hospital 290 inmates were treated, of whom 91 were discharged as apparently cured. In the tuberculosis infirmary there were 82 patients; new-born infants to the number of 141, as well as 25 recruits, were vaccinated against infection. In the treatment of trypanosomiasis "269 Fournau" and "417 Fournau" were tested. Of those put under "269" treatment, one, in the early stage of the disease, continued sterile as to blood, with the cerebrospinal fluid normal and the weight increased, for two months after receiving 13 gm.; and in two others, in the late stage, the blood was sterilized and the cerebrospinal fluid reverted to normal lymphocyte and albumin ratios after 28 gm. and 42 gm. respectively—in successive courses consisting each of 1 gm. daily

for 4 days. Of those treated with "417," one was a chronic case, in which, after 48 gm., the blood was sterilized but the cerebrospinal fluid remained profoundly altered; the other two were early cases, and in one of them parasites reappeared in spite of a total dosage of 20 gm., while in the other parasites reappeared after 4 gm. had been received but the blood remained sterile after 12 gm. The drugs in question were given by the mouth. "Goyl," a new proprietary drug from the Belgian firm Meurice, tried in the treatment of yaws was found to be comparable with stovarsol; and "chardyl," a new drug, of the same origin, for dysentery, to be comparable with yatren. Of typhoid fever, unknown in Leopoldville before 1927, it is said that natives are less susceptible to infection than Europeans, but suffer more severely. Antilarva measures on a small scale have been found to be of little use in the local attempts to control malaria. Sixty-eight persons—medical, sanitary, and religious—took the laboratory course in the diagnosis and treatment of the prevalent endemic diseases.

A. A.

KENYA, Colony & Protectorate of: **Annual Report of the Medical Research Laboratory for the Year 1928** [KAUNTZE (W. H.), Deputy Director of Laboratory Services].—*Kenya Ann. Med. Rep. for Year ending 31st December, 1928.* pp. 101–129. With 4 figs.

This report summarizes the work of separate sections of administration, serology, vaccination (calf lymph), pathology, medical zoology, medical entomology, and biochemistry. It is mainly a record of diligent routine. Laboratory routine, however, in any new-settled country, is a valuable if not spectacular species of research, particularly when facilitated by well-trained, trustworthy, and assiduous laboratory attendants. It is a complaint of this report, however, that the native African attendant is deficient in the quality of assiduity and may throw up his work at a day's notice. Attendants of that sort, some of whom, moreover, have not ambition enough to learn to write, are hardly entitled to the dignified appellation of "laboratory assistants."

The following items are of general interest; but it must be understood that the results of much work that is distinctly purposive research are not published in this report. A comparison of various different methods of separating worm-eggs from faeces awards the first place to the CLAYTON LANE flotation-centrifugation method, and a similar comparison of methods of investigating protozoa is decided in favour of simple centrifugation with saline. An interesting scrutiny of the deposits that may accumulate in native finger-nails revealed, in 15 out of 50 occupants of the local jail, eggs of worms, chiefly threadworm and tapeworm, never ascaris, and not any cysts. A hookworm census of a typical coast community showed a 100 per cent. infection. The section of medical entomology reports continued observations of seasonal occurrence, house-frequency, natural infectivity, breeding-places, and effects of control of anopheline mosquitoes, and the continued filling-in of borrowpits in Nairobi. Rat-flea and field-rodent surveys are still in progress. Cordylobia attacks have been rather frequent among Europeans in Nairobi. In the biochemical section the influence of the addition of calcium carbonate and bone-flour to a prison hospital diet has been studied, and retention of calcium has been verified by examination of faeces; other problems of nutrition are in course of investigation.

In the pathological record 51 cases of malignant tumour in native Africans appear—31 carcinoma and 20 sarcoma. In 7,992 examinations of faeces for intestinal parasites only 2,136 were negative. Multiple infestations were common, in a few cases running up to six species in one host. The species identified are *Ancylostoma duodenale* in 2,343 cases, *Trichuris trichiura* in 2,269, *Taenia saginata* in 1,729, *Ascaris lumbricoides* in 1,591, *Strongyloides stercoralis* in 340, *Schistosoma mansoni* in 317, *Oxyuris vermicularis* in 32, *Hymenolepis nana* in 11, *Schistosoma haematobium* in 3, Heterophyes in 1; *Entamoeba histolytica* in 78 cases; other species of amoebae in 888, *Giardia intestinalis* in 65, and other species of flagellates in 65. In blood examinations for malaria parasites *Plasmodium falciparum* was disclosed in 1,082 cases, compared with 121 cases of *P. malariae* and 42 of *P. vivax*.

A. A.

TANGANYIKA TERRITORY. Annual Report of the Medical Laboratory Dar es Salaam for the Year ending 31st December, 1927 [CLEARKIN (P. A.).]—32 pp. With 1 map & 1 graph. 1928. Crown Agents for the Colonies, 4 Millbank, London, S.W.1. [2s. 6d.]

This Report, more than half of which is contributed by the entomologist, is full of matter, but mostly of local interest. Of 316 helminth infestations observed in 459 specimens of African faeces, 294 were *Ancylostoma*. Of 49 specimens of African urines, 46 contained *Schistosoma haematobium*. Of 128 African sputa, 44 were infected with the tubercle bacillus. Five cases of sarcoma and 5 of carcinoma were identified microscopically in Africans, 2 of the latter being in the male breast. Five cases of lymphatic leukaemia were identified in Africans. The common anophelines are *A. gambiae* (= *costalis*) and *A. funestus* (*A. mauritanus*, *A. squamous*, and *A. pitchfordi* have also been noticed). *A. gambiae*, which is fairly catholic in its tastes, has been found breeding in a roof-gutter of a European house, but its larvae were detected in only one out of more than six thousand crab-holes examined. Both *gambiae* and *funestus* are described as "domestic species" of the native quarter of Dar-es-Salaam, where of 127 of *gambiae* collected, 26 were found infected with malaria, and of 165 *funestus* collected, 17 were infected. An examination of the children in the native quarter showed that nearly all of them had malaria parasites in the blood.

A. A.

EGYPT, Ministry of the Interior. Department of Public Health. Annual Report of the Public Health Laboratories for the Year 1927.—29 pp. 1929. Cairo. Govt. Press.

Of the 29 pages of this report 18 are descriptive, and these deal for the most part with matters of laboratory organization and routine work. Investigation of molluscan intermediary hosts of Bilharzia has been continued, and it has been found that infection of pond-snails is exceptional in the winter months. A new intermediary host, *Planorbis mareoticus*, has been added to the list. In a village in the Dakhla oasis, having as its sole water-supply an artesian stream rife with *Bullinus contortus*, operations [not fully described] for destroying these snails seem to have been successful. An [unspecified] apparatus was devised to deliver automatically into the stream so much copper sulphate as should maintain the water at a strength of 5 parts of the

salt per million. No living snails could be found at examinations made 6 and 10 months afterwards. At the same time infected inhabitants of the village were subjected to a full course of antimony treatment. Arrangements for an ancylostomiasis survey were completed during the year, and trial of a new anthelmintic, tetrachlorethylene, were made, the results of which are to be published. At the Antirabic Institute 2,868 patients appeared, of which about half were sifted out as superfluous, and 1,638 had the complete course of treatment. Of these, 6 died during treatment, 6 died within 15 days of their discharge, and 5 died more than 15 days after discharge.

A. A.

SERGEANT (Edmond). Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1928. [**Report of the Algerian Pasteur Institute for 1928.**]—*Arch. Inst. Pasteur d'Algérie*. 1929. Mar. Vol. 7. No. 1. pp. 121–150. [43 refs.]

This interesting report is shared in equal parts by subjects of special research and statistics of routine work. The research section includes an instructive disquisition on the methods practised locally for the abatement of malaria—by regulation and drainage of stagnant waters, by regular use of quinine to exhaust the reservoirs of infection in man, and by mechanical protection supplemented by technical instruction of the population. Studied attempts to prepare a convenient and efficient vaccine against Oriental sore have not achieved success. Antituberculous vaccination of new-born infants has been actively practised; the results followed up in 208 cases tend to establish the efficacy of B.C.G. vaccine. Recent observations confirm the impression that the amount of endemic tuberculous infection is small. The study of fungous skin-disease is continued. A third case of infestation by *Fasciola hepatica* has been discovered—in a European. Research has shown that the Algerian fixed virus of rabies used in the preparation of vaccine has lost much of its virulence without detriment to its immunizing quality; 1,278 persons completed prophylactic treatment, the mortality being 0.39 per cent.; the offending animals in 1,114 cases were dogs, and in 114 cases cats, the small remnant including, in numerical order, rat, ungulates, human victims, jackal, ferret, hare, mouse and monkey.

A. A.

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. **Annual Report for the Year ended 31st December, 1928** [LISTER (F. S.).]—87 pp. With 2 charts & 1 plate. 1929. Johannesburg.

The doings of the Research Division fill 28 pages, and of the Routine Division (which also contains original quanta), 43 pages of this Report.

In the Department of Bacteriological Research two types of *Past. pestis* have been separated in culture and distinguished as S and R—S being virulent, efficient as a prophylactic, and producing on inoculation an efficient therapeutic serum, but tending the longer it is kept under culture to change to the R type, which is negative in the three properties specified. The study of an epizootic among Namaqua gerbilles associated with a Pasteurella organism similar in morphology, in culture characters and in staining reactions to *Past. pestis*, but pathogenically different (since the disease could not be transmitted either by culture or

by blood to rats and guineapigs, and not invariably to *Lobengula gerbilles* from Johannesburg, though transmissible to half-grown rabbits and to *Lobengula gerbilles* from Cape Town), has introduced an element of ambiguity into the early diagnosis of a rodent epizootic. A study of the practical value of bacteriophage against plague is judicially adverse—since for obtaining immunity 4 or 5 injections are required, and for treatment even a strain of high virulence is inconstant and erratic in its effects. Cultivation of bacilli from tuberculous lesions of various kinds proves quite conclusively that the bacillus in native South African infections is exclusively of the human type. An analysis of 350 cases of declared tuberculosis in native miners points in the great majority to an initial lesion in the tracheo-bronchial glands, not in the apex of the lung. A new excitant of hay fever has been discovered in the pollen of *Prosopis julifolia*, a leguminous tree of the *Mimosa* suborder; and three more cases have occurred to support the view that the antibodies from grass pollens may have their specific limitations. Interesting studies of the pneumococcus have shown for certain groups that certain specimens in tissue and in blood-culture, carefully dried and stored, have retained life for 11 and 8 years respectively. A varied search among local sources for a bacteriophage competent against the commoner pathogenous micro-organisms has disclosed from typhoid stools one active against the dysentery group of bacilli; from activated sludge one strongly active against the dysentery group and *B. paratyphosus* A; and from flies one potent against the dysentery group and *Past. pestis*. (The original contributions of the Departments of Parasitology and Entomology have been published elsewhere and previously noticed here.) In the Department of Pathological Research work was continued on tumour-cells and on the subject of local immunity. In the latter study rabbits were submitted for definite terms, at different intervals, to a spray of suspensions of dead or living pneumococci; subsequently their lung-tissue was cultivated, and the culture-medium was found to have in a high degree the power of agglutinating pneumococci.

In the Routine Division the aggregate of specimens, etc., dealt with was 90,197, of which 70,326 related to bacteriology. In the Bacteriology Department a classification by blood-groups was made of volunteer blood-donors enrolled for the necessities of the local general hospital. A case of undulant fever was discovered in a farmer in whose stock a prior outbreak of contagious abortion had occurred. The therapeutic value of bacterial filtrates was studied, and was found to be good—rapidly so in the case of erysipelas. In certain small outbreaks of pneumonia in native mines, clinically not quite typical, the bacteriology showed an influenza followed by a purely streptococcal infection of the lungs. In the routine of pathology 5,489 specimens were examined and 430 autopsies were conducted. Carcinoma was found in 13 native autopsies. Observations are summarized of a case of chordoma of the clivus. Cases of appendicitis caused by *Bilharzia* are noticed. In the routine of parasitology (7,852 specimens) evidence of amoebic infection occurred in 15 per cent. of 1,739 specimens of excreta examined, and of *Schistosoma mansoni* in 26 specimens. *S. haematobium* was found in 172 urines. In the Vaccine Department evidence is accumulating of the prophylactic efficacy of oral administration of typhoid vaccine.

The Report, full of instruction and well printed, is worthily and conveniently garbed like an ordinary paper-covered book—in most grateful contrast to the awkward customary foolscap livery.

A. A.

MAURITIUS. Annual Report of the Bacteriological Laboratory for the Year 1927 [BARBEAU (L. G.), Supt. Bact. Lab.].—*Mauritius Ann. Med. & San. Rep. for the Year ending 31st December, 1927.* pp. 14–23.

The number of samples examined in the bacteriological laboratory was 8,062. The intestinal parasites observed in 911 specimens of faeces were, in order of abundance—of protozoa, *Entamoeba histolytica*, *Giardia intestinalis*, *E. coli*, Trichomonas, *Chilomastix mesnili*, Enteromonas, Cercomonas; and of worms, Trichuris, Ascaris, Hookworm, Strongyloides, Oxyuris (4), and Davainea (1). Blastocystis occurred in nearly one-fourth of the samples and is believed, locally, to be the cause of a chronic and relapsing diarrhoea, characterized by profuse, gassy, and sometimes glairy and blood-stained stools, and accompanied with flatulence and tenderness of the belly. Blastocystis infestation is wide spread among the local poultry and is believed to be pathogenous to them; it also occurs in a common toad of recent introduction. Sixteen cases of malignant tumour were verified during the year.

CALMETTE'S antituberculosis vaccine is in considerable demand and has been used this year for 1,546 infants and 400 new-born calves. The original culture was brought from Paris, and is maintained locally in accordance with Calmette's technique, and fresh vaccine is prepared for use at least once a week. A special report on the preparation and preservation of cultures and of vaccine emulsions is annexed.

A study of the pH of the local anopheline breeding waters has been made. *A. gambiae* (=costalis) and *A. maculipalpis* breed in alkaline or faintly acid waters; *A. funestus* breeds in waters that are on the acid side. A search for the intermediary host of *Schistosoma haematobium* has been carried through 1,670 pond-snails—*Limnaea mauritiana*, *Melania tuberculata*, and "*Paludina vivipara*"—but without success, although other species of cercariae have been discovered, which are the subject of a detailed description and illustrated report. Among the human tumours examined was a vaginal growth containing eggs of the *Schistosoma* and a growth in the brain containing objects suggestively like those eggs.

A. A.

MADRAS. Report of the King Institute of Preventive Medicine Guindy for the Year ending 31st March 1928 [KING (H. H.), Director].—pp. 32+3. 1928. Madras. [8 annas.]

The burden of this report is the great increase in routine work, particularly in the manufacture of cholera vaccine, for which there was an enormous demand and a total output of 727,000 cc.; the vaccine is reported to have given good protection. The consumption of other stock vaccines—typhoid in particular—was increased also. The number of primary antivariola vaccinations was 1,330,470, with a case success-rate of 96·9 per cent. and an insertion success-rate of 89·2 per cent. It is noted that the best yields both in quantity and quality of pulp were obtained from calves in the 3 months December–February. Among the interesting items recorded under clinical bacteriology is a comparison (1,140 instances) between the Wassermann and the Kahn tests, in which several Wassermann-negatives were observed to be definitely Kahn-positive, while very few Kahn-negatives were strongly

Wassermann-positive. Another interesting item is the cultivation from a bit of tissue from a case of suspected gas-gangrene of an organism of the Welch group which was mortal to guineapigs and produced gas at the site of inoculation, and yet was aerobic. The report for the section of public health consists of details of routine work in connexion with water-supplies of municipalities and railway-stations, food-stuffs, and purification of water and sewage. Among original investigations must be noticed a house-to-house study of human filariasis in the town of Saidapet. Here of 1,164 persons examined 16·3 per cent. were found infected, and of 1,741 female *Culex fatigans* 34 per cent. This interesting study is now being pursued from the pathological and therapeutic standpoints.

A. A.

BOMBAY. Report of the Haffkine Institute for the Year 1928 [SOKHEY (S. S.), Offg. Director].—43 pp. 1929. Bombay: Government Central Press. [Annas 2 or 3d.]

Much of the report is occupied with official details, a general review of the activities of the institute and tabular matter relating to routine examination, prophylactic treatment for rabies, and vaccine output. It is interesting to learn that the biochemical department of the laboratory has started work on the establishment of standards applicable to Indians enjoying good health. Western health standards are likely to differ considerably from these. A large number of blood analyses have already been carried through in regard to standards for non-protein nitrogen, uric acid, creatinine, phosphates, cholesterol, fatty acids and the plasma proteins—fibrin, globulin and albumin. Standards of blood-cell counts and haemoglobin are also being worked at.

Anti-plague enquiries are referred to in some detail. It was found that *Past. pestis* is one of the few Gram-negative achromogenic aerobic bacilli to give a positive nitrite reaction. Another peculiarity of the plague bacillus is its greatly improved growth on blood agar and this fact, as well as the positive nitrite reaction, have formed additional tests for purity of plague cultures. Much controversy has arisen over the possibility of transmission of plague by certain species of fleas and on the possibility that this may explain the immunity of certain localities from plague. In the careful experiments now carried out it seems evident that successful transmission can be effected by means of *Xenopsylla astia* and *X. brasiliensis* as well as by *X. cheopis*. Parallel experiments have been done with a plague antiserum and a plague bacteriophage. It was found that a rabbit immune serum administered intravenously 24, 48, 72, 96 and 120 hours after infection gave mortality rates of 0, 9, 29, 32 and 33 per cent. respectively. In the case of the bacteriophage, which could bring about lysis of a culture in 2 hours, the corresponding rates were 50, 69, 60, 70 and 85·7. Untreated control mortality rates varied from 81 to 89 per cent. A short paragraph states the results of experiments on the duration of immunity in rats surviving experimental infection with virulent plague bacilli. The intervals used were of 30, 60, 90, 120, 150, 180, 210, 240, 270, 300 and 360 days. These rats were still completely immune to fresh infection, "at the end of 300 days from the date of the original infection." After 330 and 360 days the mortality is about 19 per cent.

Enquiries on maternal mortality in childbirth are being vigorously pursued along certain definite lines. The most important of these is on the so-called anaemia of pregnancy which is not regarded as a true pathological entity. "The macrocytic anaemia, evidently quite common amongst the women in Bombay, is made worse by the strain of pregnancy." Tentatively the view is expressed that this type of anaemia is very likely to be a deficiency disease. Investigation into the blood changes in osteomalacia, which is a comparatively common disease in India, have rather unexpectedly shown low inorganic phosphate values with only slightly reduced calcium values. Further observations too have been made into the age of primiparae in India. The average age of those watched in Bombay hospitals was 20.5 years. Of the 1,112 cases, 12 per cent. were below 16 years of age, and the youngest was 14 years of age.

Investigations were continued into the type of bacilli causing surgical tuberculosis. It had been previously found that 40 cases of cervical adenitis, 8 of axillary gland tuberculosis and 17 of pulmonary disease all furnished strains of human type. Now one single case of cervical glands has provided the first instance to be recorded in which a bovine tubercle bacillus has been found to cause human tuberculosis in India. Many experiments are being carried out to determine the non-pathogenicity of B.C.G. tubercle vaccine. "Specific lesions are observed in the lungs of rabbits after intravenous inoculation with B.C.G. when death takes place within a few days after inoculation, but they are regressive, and tend to disappear after some time." Other experiments to test the value of the vaccine as an immunizing agent are in progress. Transformation experiments of one type of tubercle bacillus into another are among those which are being undertaken.

W. F. Harvey.

ASSAM. King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong. The Twelfth Annual Report for the Year ending 31st December, 1928 [MORISON (J.).—38 pp. 1929. Shillong. [1s. 8d.; Re.1-1.]

This report treats mainly of the activities of the institute in connexion with antirabic treatment and with the bacteriophage treatment of dysentery and cholera. As antirabic treatment is likely to become more and more decentralized the author of the report takes this opportunity of presenting statistics of 16,155 cases treated during 1917 to 1928. In this way data are made available which are comparable with the 20,500 cases of a quinquennial period analysed by McKENDRICK. A standard, moreover, is furnished by which the future results of decentralized treatment can be gauged. Bacteriophage is issued from the institute by the Government of Assam at a price "which does not cover expenses, but places the 'phage within the reach of every dispensary." This 'phage is polyvalent for dysentery and cholera, nor is there any evidence that any one of the 'phage fractions present exerts any weakening influence upon any of the others. The dysentery component is prepared from Shiga, Flexner, Y and Sonne strains. A summary of reports on the use of bacteriophage in cholera gives 24 deaths, 2 of which were moribund cases, out of 80 treated and 50 deaths out of 92 not treated. Comprehensive and detailed tables of antirabic statistics complete the report.

W. F. Harvey.

FEDERATED MALAY STATES. **Annual Report of the Institute for Medical Research for the Year 1928** [ALLEN (G. V.)].—*Federated Malay States Ann. Rep. Med. Dept. for Year 1928*. Appendix A. pp. 27-45. [2 refs.] Appendix (A) III. [Division of Pathology] pp. 58-68; and Appendix (A) IV. [Division of Entomology] pp. 69-74.

Matters of interest in this fine report include the following items:—Continued investigation of tropical typhus, endemic on a local oil-palm estate—85 cases occurred in 1927-28—show that the infection is almost restricted to men working in or round about the oil-palm tree, a fact that suggests a carrier living in these trees or their exuviae. Attempts to infect laboratory animals with the virus—largely successful with rats and occasionally with guineapigs—and unsuccessful efforts to cultivate it, are described. A long account of clinical and laboratory observations is given. In one unusual case of the disease—in a factory hand—the blood agglutinated the W strain of *Proteus* X9, and as a sequel experimental studies of this and the Kingsbury strain of that bacillus were undertaken and are here summarized.

From observations that in the course of the quinine treatment of malaria an increase occurred in the number of crescents, to such an extent that where 42.3 per cent. of the patients were carriers on admission 64 per cent. had become carriers on discharge, small (non-toxic) doses of plasmoquine were added to the standard treatment—with the anticipated effect of suppressing the crescent, and the local importance of this modification is emphasized. A search for precipitin tests for malaria was disappointing. "Aseplene," a widely advertised proprietary cure for malaria, was tested and found useless. Troposan (May and Baker), isomeric with stovarsol, caused rapid disappearance of the parasites in 40 tests.

Leptospirosis, until lately recognized only among rubber coolies, was this year encountered in 7 Europeans not directly connected with rubber planting. The cases are summarized along with an analysis of the clinical phenomena.

An analysis of the case-sheets of 528 consecutive hospital cases of tropical ulcer is given, with an account of various test treatments of 50 cases. The lesion appears to be restricted to coolies, and the most important predisposing cause is thought to be food deficiency. Bacteriological study has discovered very commonly a small haemolytic coccus, and also frequent diphtheroid organisms—pure cultures of which latter invariably produce a small characteristic abscess when injected into or under the skin of guineapigs. Sound surgical procedure and good feeding are thought to be above specially chosen drugs, in treatment.

Necessary investigations of leprotic fever have been pursued—its frequency, its associated lesions, its predisposition, causation, duration, its effect for good or ill and its treatment; the most successful treatment was found to be desensitizing the patient with ephedrin or adrenalin. Details of introduced modifications of the Rubino reaction for the diagnosis of leprosy, and of the results of the Wassermann and the Kahn tests in leprosy are given, and promising results of trials of alepol and krysolgan treatments of the disease are reported.

Sanocrysin in tuberculosis appears, so far as a small experience goes, to prolong the course of the disease in Asiatics, but without promise of cure.

Among other things described are, the isolation of an organism similar to *Eberthella belfastiensis* of Wilson from a fatal case of a typhoid-like fever disclosing ulceration of Peyer's patches and multiple liver abscesses ; two cases of low fever where *Alcaligenes faecalis* was believed to be responsible ; five cases of cutaneous blastomycosis ; three cases of yaws treated successfully with tryposan (May & Baker) ; 9 cases of amoebic dysentery where bistovol (May & Baker) seems to have been fairly effective ; and modifications and comparisons of serological tests for syphilis.

In the report of the Pathology Department, pp. 58-68, the statistics of antirabies treatment are very fully recorded ; 146 cases were treated (SEMPLE'S method), with one fatality after treatment ; and 1981 dogs had the prophylactic treatment. Other matters of note are, 3 fatal cases of ascariasis, where multiple liver abscesses were due to the penetration of the worms by way of the hepatic duct ; 3 fatal cases of melioidosis, where multiple abscesses were found in the liver and other viscera ; a long and well-considered account of the liver treatment in cases of secondary anaemia ; and a discussion of 3 fatalities occurring in the course of an antisyphilitic treatment where the patients had received 2, 3, and 4 injections respectively (among a very large number of other cases undergoing the treatment) of stabilsarsan 0.3 gm. with 0.5 cc. bismostab. In the review of the morbid histology 129 malignant tumours are mentioned and particularly 12 cases of primary cancer of the liver in Chinese males.

In the Entomology Report, pp. 69-74, the problem of the carrier in tropical typhus has first place. Here a search among the material from the oil-palm trees led to the discovery of an incredible number of mites of five families among old male flowers. Furthermore, a survey of local rats has brought the number of their ectoparasites to 16 species. Tests of anopheline larvicides have confirmed the opinion that for efficiency and cost there is nothing to compare with mineral oils. An objection against Paris green, in work on estates, is that managers cannot trace and check the doings of the larvicidal gang, as they can with oil. An interesting note about breeding-places, judged by experience of over twenty thousand observations, is that very few species of Anopheles are definitely and specifically restricted to a particular type—e.g., 19 out of the 24 local species and varieties known have been found in earth drains. A large and multifarious amount of other useful routine work is recorded.

It is a pity that such an interesting report should be printed on the inconvenient and incongruous official foolscap.

A. A.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. 1929.
Dec. 1. Vol. 69. No. 12. pp. 1184-1197.—Jaarverslag van de Landskoepokinrichting en het Instituut Pasteur te Bandoeng over 1928. [Annual Report of the Vaccine Establishment and the Pasteur Institute at Bandoeng in 1928.]

From 53 buffaloes 22,342 kgm. lymph was obtained ; the quantity issued by the Institute sufficed for over $9\frac{1}{2}$ million vaccinations. As far as controlled ($1\frac{1}{4}$ million cases) 96.5 per cent. of the vaccinations succeeded.

Of 978 individuals reporting for antirabic treatment, 692 underwent a full cure, but the results of the examination of the suspected animals

showed that such had not been necessary in 107 of them; 309 of them had certainly been bitten by infected animals. Six patients (natives) died in the course of this year from rabies, all within 30 days from the beginning of the cure.

Of preliminary treatment with dead preserved fixed virus before their arrival at the Institute, which has been practised since 1921, no distinct results were seen. Yet it is to be continued.

The report further contains figures of the number of pathological examinations performed by the laboratory and of quantities of sera and vaccines issued by the Institute.

W. J. Bais.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. 1929. Vol. 69. No. 9. pp. 853-872.—Uit het Jaarverslag van het Geneeskundig Laboratorium over 1928. [**Annual Report of the Military Medical Laboratory for 1928.**] [18 refs.]

It is always interesting to laboratory workers to know what routine and research investigations are being carried out in other laboratories. The reports on material sent in numbered 16,420 of which 7,186 were bacteriological, 8,563 Wassermann reaction, and 671 medico-legal. Two new species of anophelines were added to the collection: *A. longirostris* and *A. travestitus* from New Guinea and from Ceram. Altogether 187 species of mosquitoes, anophelines and culicines, are known to occur in the Netherlands Indies. It is probable that some 300 species altogether are to be found in the Archipelago. The routine investigation of suspected enterica cases gave as positive percentage results for Widal, blood culture, stool, urine, pus and post-mortem examinations 51.2, 18.8, 15.6, 6.8, 54 and 25 respectively. A method which is recommended in examination of stools for helminthic ova is to clear thick films with cedar oil. The difficulty of finding dysentery bacilli in stools, examined some time after evacuation, was exemplified by the negative result obtained when 3 freshly passed stools were hurried off to the laboratory by car and yet proved negative, while 9 cases out of 10 from the same population were positive by immediate culture on Endo plates. Treatment of an epidemic of Shiga dysentery by means of antiserum which had proved strikingly effective in other epidemics, gave very disappointing results. The opportunity was taken to test out the value of dysentery bacteriophage by oral administration as a prophylactic. There were 119 persons treated with bacteriophage with 4 cases of the disease and 242 untreated controls with 17 cases. The difference of incidence in the two groups cannot be regarded as significant, when the probable error is taken into account. A virulent bacteriophage was tested curatively for plague in two series of 16 animals, of which 12 were test animals, and 4 controls. All the animals died within 5 days, including the controls. Three treated animals, however, did live 1 to 3 days longer than the controls. The longest lived animal was the only one in which the appearances in any way resembled chronic plague, with very few bacilli in the spleen. In the malarial action, treatment of salt water fish ponds with Paris green showed that it is undoubtedly possible thus to combat the danger from larvae without raising the arsenic concentration in fish or in water to any notable degree. The chemical section included among its investigations, one on the improvement of the mode of preparation of

chemically pure anti-beriberi vitamin. Anti-beriberi vitamin preparations are likely to be of great service in connexion with the Mecca pilgrimage. It was decided that the polished rice on pilgrim ships must contain 1 gm. activated acid clay per kgm. and the help of the consul at Jeddah was invoked for the sale to each pilgrim of a bottle of vitamin tablets. A preparation, used for subcutaneous and intravenous injection, was productive of some wonderful cures even in patients moribund with acute beriberi, but to the accompaniment of undesirable symptoms. Experiments on mice seem to show that the removal from the preparation of the precipitate obtained with silicotungstic acid would also obviate the unpleasant symptoms of its use in man. The report concludes with a list of publications for the year.

W. F. Harvey.

KOUWENAAR (W.). Jaarverslag van het Pathologisch Laboratorium over 1928. [**Annual Report of the Pathologic Laboratory in 1928.**]—*Meded. Path. Lab. t. Medan-Sumatra*. 1929. No. 6. 51 pp. With 6 graphs.

The activities of the Laboratory during 1928 are summarized in this report; 10,472 bacteriological and 9,931 serological examinations, 593 examinations of pathological specimen and 424 chemical tests were made. The total number of routine examinations increases year by year. Advisory and information work are mentioned. The research work, as far as of general importance, has already been published elsewhere, and previously referred to.

In an appendix, hints are given for the preservation of pathological samples, which are to be forwarded to the Laboratory and for the technic of taking samples of water for bacteriological examination,

W. J. Bais.

ARCHIVES DES INSTITUTS PASTEUR D'INDOCHINE. 1929. Apr. No. 9. pp. 83-116. With 4 charts.—Fonctionnement des Services pratiques des Instituts Pasteur d'Indochine en 1928. [**Work of the Pasteur Institutes of Indochina in 1928.**]

At Saigon, 1,318 persons underwent the complete course of treatment for rabies, without any mishap; more than $4\frac{1}{2}$ million doses of Jennerian vaccine, 5 million doses of cholera vaccine and more than 82,000 doses of Calmette's antituberculosis vaccine were distributed, and the issue of various other vaccines increased greatly. In the malaria laboratory attention was concentrated on the anopheline fauna and the study of local epidemiology.

At Hanoi, 642 persons went through the complete course of treatment for rabies, of whom 9 died of the disease, the heavy mortality being explained by the fact that 7 persons came too late for treatment and 8 had been very badly bitten; and that only 2 of those who were promptly treated died—in 18 and 19 days respectively—after the course of treatment. At Hanoi more than $6\frac{1}{2}$ million doses of Jennerian vaccine, and more than 62,000 doses of antituberculosis vaccine were issued; and in the pathology department 190 malignant tumours were recognized.

The work of the Institutes in the field included, besides malaria inquests and surveys, and studies of native diets in relation to beriberi: (1) an investigation by Dr. SOUCHARD of the prophylactic and therapeutic

value of D'HERELLE's anticholera bacteriophage ; and (2) a particular study of the treatment of equine surra. The first of these expeditions was frustrated in various ways ; no opportunity of testing the prophylactic value of the bacteriophage occurred, and only 7 cases of testing its therapeutic value, and of these 7 cases 6 died, the stock of bacteriophage used being that used by D'HERELLE in India, obtained through the Hygiene Bureau of the League of Nations at Singapore. In the treatment of equine surra the new remedy of 309 Fournneau with sulpharsenol in a single injection was tried, and its efficacy was fully confirmed. Of 20 infected horses 2 were kept as controls and 18 received the treatment ; the 2 controls died, and all the others recovered completely. The new remedy therefore is hailed as a precious acquisition.

A. A.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE & HYGIENE. 1929. Jan. 30. Vol. 22. No. 4. pp. 303-308.—
Laboratory Meeting.

The Laboratory Meeting of the Royal Society of Tropical Medicine on November 15th, 1928 seems to have been quite a tea-party for medical entomologists. Miss Mary BEATTIE provided living larvae of British tree-hole-breeding mosquitoes, and Miss E. K. SIKES an exhibit of larvae, pupae, and adults of fleas (*Ceratophyllus wickhami*) from a squirrel's nest, along with living Chalcid parasites of the larva of that flea ; Dr. P. A. BUXTON furnished forth an interesting assortment of living insects and other arthropoda, including 4 species of Rhynchota, *Glossina tachinoides* reared from puparia in London, various stages of *Ornithodoros moubata*, a larva of *Megarhinus brevipalpis* transported without mishap from Nigeria, 4 common but important insect-pests of food-stores, and resting larvae and pupae of the Halticid beetle of the Kalahari, *Diamphidia nigro-ornata*, used locally for envenoming arrows ; Mr. B. JOBLING contributed mounted specimens of eggs, larvae, and adults of British midges ; Dr. A. C. STEVENSON showed sections of monkey-lung invaded by the notorious Gamasid mite *Pneumonyssus* ; and Dr. V. B. WIGGLESWORTH displayed photographs illustrating the bionomy and methods of control of tsetse-fly (*Glossina morsitans*, *tachinoides* and *palpalis*) in West Africa.

Medical protozoologists also were well entertained. Dr. J. L. DAVIS showed blood-films illustrating a new Babesia from a Sudan wild cat ; Dr. C. M. WENYON displayed a cinematograph film portraying scenes in the kala-azar areas of Bengal, photographed by Dr. Everard NAPIER ; and he and Dr. E. HINDLE exhibited preparations showing the result of intratesticular inoculation of the hamster with *Leishmania tropica* ; Dr. WIGGLESWORTH showed developmental forms of trypanosomes in tsetse-fly ; and Professor YORKE exhibited preparations showing developing crescents, and a preparation displaying large numbers of exflagellating crescents obtained by the concentration (immediate centrifugating) of a solution in citrated saline of material got from infected spleen by puncture.

Dr. P. MANSON-BAHR and Dr. H. WILLOUGHBY produced documents relating respectively to an extraordinary case of amoebic hepatitis, to a case of generalized infection with *Schistosoma mansoni* in a European, and to a case of splenic anaemia resembling kala azar in a European seaman ; also photographs of chigger infection ; and photographs and skiagraphs of a case of ainhum with complications. Major H. C.

BROWN and Dr. J. C. BROOM demonstrated a simple microcataphoresis cell for the study of the migration rate of bacteria. Sir A. CASTELLANI exhibited a collection of pathogenous fungi, and another of bacilli of the metadysentery group; Dr. Salisbury SHARP a case of goundou in a man who has always lived in England; and Dr. WENYON one blood-film showing a mixed infection of microfilariæ—*F. bancrofti* and *F. malayi*—and another showing a vegetable filament deceptively like a microfilaria.

A. A.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE. 1929. June 25. Vol. 23. No. 1. pp. 1-7. **Laboratory Meeting.**

The Exhibits included: Cultures and preparations of *Trichomonas vaginalis*, from a survey of 100 individuals in England, in whom evidence of infection occurred in 15 by direct smear and in 20 by culture.—Dr. Mary ANDERSON. Trypanosomes from blood of canary and their developing forms in the body-cavity of a living bird-mite, *Dermanyssus gallinae*.—MACFIE & THOMSON. Plate cultures of *Trypanosoma cruzi* and of Leishmania, showing developing forms.—RAY. Leptomonas from labrum and gut of *Glossina morsitans*.—ROBINSON. Sporulating forms of *Plasmodium falciparum* in placental blood.—GRAY. Preparations showing influence of temperature upon exflagellation of microgametocytes of *Plasmodium vivax*: at 25° C. exflagellation occurred in 5 to 7 minutes in July but in not less than 15 minutes in February; between 10° C. and 19° C. not in an hour, and after 4 hours flagella were formed but were not detached; at 0° C. nothing was observed after 24 hours.—JAMES. A suctorian Infusorian, *Allantosome intestinalis*, from the intestine of a horse, recovered from the faeces by Sheather's sugar flotation method.—WENYON and SHEATHER. Sections of yellow-fever liver showing in the nucleus of the liver-cells eosinophile inclusions resembling those found in other diseases caused by filterable viruses; sections of other origin and provenance, showing Negri bodies and other similar intranuclear inclusions, were shown for comparison and to support the accepted opinion that yellow fever is caused by a filterable virus.—HINDLE and STEVENSON. A new tsetse-fly of the *G. palpalis* group, from the Belgian Congo.—AUSTEN. Some Culicines from China.—MACARTHUR. Larva and pupa of *Hodgesia sanguinis*, a mosquito from Lagos; the pupa showing the characteristic bifid breathing-trumpets.—WIGGLESWORTH. *Pneumonyssus griffithi*, a mite from the lung of a monkey, and *Acarapis woodi*, another mite from the tracheae of a hive-bee.—JOBLING.

The apparatus and methods demonstrated included: A portable apparatus for the electrical determination of H ion concentration.—BROWN and BROOM. An adaptation of the HORROCKS Box for estimation of available chlorine in bleaching-powder, details of which were published in the Journal of the R.A.M.C., in August, 1927.—ELLIOTT. The nigrosin method of demonstrating spirochaetes and such-like.—GRAY. Aids to the accurate counting of hookworm larvae, illustrating not only the advantage of a flat-bottom dish, to obviate focussing, but also the necessity of having the dish brim full of water under cover, to eliminate rippling.—LANE. Photographs of a case of Ulcerating Granuloma showing slow but sure results of treatment by injections of tartar emetic combined with stimulative protein therapy.—Low.

A. A.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

DUNN (T. B.). **Amoebiasis.**—*China Med. Jl.* 1929. June. Vol. 43. No. 6. pp. 564–577.

A concise and lucid exposition of the whole state of amoebiasis as known up-to-date, and rather more than is known by verifiable and demonstrable proof; for the author has marred an excellent summary of an important subject by uncritical [apparent] acceptance as amoebic of clinical syndromes—e.g., arthritis, ocular lesions and defects, neurasthenia, etc.,—whose relation to amoebiasis is still only in the region of individual fancy. He accepts apparently the dictum that amoebiasis is as protean a disease as syphilis. On the other hand he has stressed the importance, too often ignored, of MCCARRISON'S experimental work with monkeys; the control monkeys remained healthy while those fed on deficient vitamin diets very often broke down with acute amoebic dysentery. Applying this to his practice the author records his success with amoebiasis patients who had been under treatment unbenefited for long periods of time. He stopped all medication and limited diet, put them on a full diet rich in vitamins, and "almost like magic, they commence to gain weight and all symptoms disappear."

H. M. Hanschell.

MANSON-BAHR (Philip) & TAIT (C. B. V.). **On the Symptomatology of Intestinal Amoebiasis. Based on a Study of 150 Cases.**—*Lancet.* 1929. Nov. 16. pp. 1028–1032. With 2 text figs. [6 refs.]

This informative paper gives a close analysis of 150 consecutive cases of intestinal amoebiasis. *E. histolytica* was demonstrated in each, and in the majority the diagnosis was reinforced by sigmoidoscopy. The authors begin by stating that the more extensive his experience of intestinal amoebiasis, the more the practitioner is bound to be impressed by the great variety of the symptoms which infection with *Entamoeba histolytica* may provoke. And in conclusion they state that the connexion between intestinal amoebiasis and the signs and symptoms is difficult to determine precisely. It depends possibly on the nature and extent of the intestinal ulceration whether the pain and discomfort are referred to one portion of the bowel or the other. Why the same infection should produce active diarrhoea in one person, and chronic constipation and flatulency in a second, cannot at present be determined. It probably depends upon the amount of mucous membrane destroyed by the amoebic infection or the resistance of the patient to this particular infection. The diversity in the nature and severity of the symptoms produced render intestinal amoebiasis one of the most protean of all protozoal infections. [This paper deals especially and fully with symptoms—and to give abstracts of a protean symptomatology must be to misreport and perhaps mislead. Only an indication can be here given of the paper's content and real worth to the clinician, who should read the original.]

Analysis of 150 Cases of Amoebic Dysentery, Symptomatology, etc.

<i>Distribution of Pain.</i>		<i>Bowel Symptoms (cont.).</i>	
(Male cases, 133 ; Female, 17.)			Cases.
Abdominal pain or discomfort :—		Tenesmus	34
Present in	126	Blood and mucus in stools	71
Absent in	24	Mucus only in stools ...	18
<i>Generalized abdominal</i>		<i>General Symptoms.</i>	
pain	Cases. 70	Pyrexia	Cases. 13
Epigastric discomfort ...	19	Hepatitis	9
Liver area	9	Emaciation	43
Gall-bladder area (right		<i>Previous Diagnoses.</i>	
costal margin)	2		Cases.
Right shoulder (referred		Neoplasm of pancreas—	
pain)	2	laparotomy	1
Gastric localized	3	Cholecystitis and chole-	
Duodenal localized	1	lithiasis	3
Transverse colon	1	Appendicitis and appendi-	
Caecal and appendicular... ..	7	ectomy	4
Sigmoidal and descending		Duodenal ulcer	1
colon	10	Tuberculosis	1
Lumbar localized	2	Bacillary dysentery ...	1
		Septicaemia (pyrexial case)	1
<i>Maxima and Minima.</i>		<i>Intercurrent Diseases.</i>	
Age at onset :—	Years.		Cases.
Maximum	64	Kala-azar	1
Minimum	10½	Hepatic abscess	5
Maximum duration	30	Tuberculous mesenteric	
Maximum period without		glands	1
active symptoms	6	Pulmonary tuberculosis ...	1
		Malaria and ankylostomiasis	
<i>Bowel Symptoms.</i>			Cases.
Diarrhoea	Cases. 114	Malaria and ascariasis ...	1
Alternating diarrhoea and		Cystitis	1
constipation	8	Pregnancy	1
Constipation	11	Pneumonia	1
Normal regularity of mo-		Malaria	2
tions	17	Sprue	2
Flatulence	37	Gonococcal epididymitis...	1

The authors note that intestinal amoebiasis may be one of the most persistent of all protozoal infections. In four of these cases infection, and symptoms, had lasted for over 20, and in one case for 30 years. Moreover symptoms of dysentery may vanish temporarily—even for long periods with apparent restoration to health—and then return, perhaps long after leaving the place where infection was acquired. In this series such a latent period of 6 years was noted in two cases ; in yet another perhaps 9 years. Latent periods of two or three years were common. The authors note that this seems as if the clinician must wait 6 years or more to ascertain finally whether the cure had been in fact successful. Occurrence of relapse may be sudden in onset, with severe diarrhoea and loss of weight. A straightforward case is usually apyrexial ; absence of high temperature is generally a valid point of differentiation between intestinal amoebiasis and bacillary dysentery. In this series 13 cases of pyrexia could not be accounted for by any other associated infection, or by coincident amoebic hepatitis. One case

presented swinging septicaemic type of fever, probably due to absorption of septic matter from bowel wall ; another a continuous fever ; five cases fever acute in onset like malarial attack, for which they were mistaken, due the authors think to recurrent embolism of liver by amoebae from the bowel. Among the cases were also noted ulceration of rectum without involvement of rest of large bowel ; intestinal haemorrhage ; painful spasmodic contraction of sigmoid colon ; haemorrhoids ; prolapse of rectum.

Neither stricture of bowel nor actual interference with passage of faeces as result of amoebic ulceration was observed. But there occurred as sequelae dilatation of colon, megacolon, 2 cases ; sprue, 2 cases. Though the intimate connexion between amoebic dysentery and hepatic abscess is universally recognized, they are seldom observed at the same time in the same individual. This association was noted 5 times in the 150 cases.

H. M. H.

JOHNS (F. M.) & TRIPOLI (Carlo J.). **The Incidence of Infection with *Endameba histolytica* in Louisiana as determined by Comparative Microscopic and Cultural Methods.**—*New Orleans Med. & Surg. J.* 1929. Oct. Vol. 82. No. 4. pp. 224–226. [7 refs.] [Med. School, Tulane Univ., New Orleans.]

Combined cultural and microscopical examination of stools of 544 inhabitants of Louisiana revealed 36, or 7.44 per cent., infected with *E. histolytica*—of whom 6, or 1 per cent., presented definite symptoms of dysentery with vegetative forms of the parasite present in stools. Thirty-five, or 6.43 per cent., were cyst carriers. A plea is put in that not only a physical examination but also a stool examination for intestinal parasites should be enforced before giving certificates for food handling.

H. M. H.

WILLIAMS (L. H.) & THOMAS (J. A.). **A Study of the Incidence of Amebiasis Carriers among Native Domestics of Haiti.**—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 74–78. [4 refs.]

The occurrence of amoebiasis among Caucasian residents in and visitors to Haiti, who had not before been aware of any chronic intestinal disturbance, or previously found to harbour *E. histolytica* cysts, and who were not exposed to the infection in Haiti other than through hand contact by native food handlers, led to this study. Using the stool examination technique of D. de Rivas [not described here] they found 50 per cent. of 108 food-handling negro domestics to be carriers of *E. histolytica* cysts. Later examination of 6 of these infected domestics revealed vegetative as well as encysted forms. All six had suffered from alternating constipation and diarrhoea. All the proved carriers were, at least temporarily, apparently deinfested and rendered non-infective, with comparative ease by administration per os over short periods of time of yatren and paroxyl. This, the authors think, is a hopeful indication that ere long progress can be made in the eradication of this tremendous reservoir of amoebiasis. Effective sanitation is, and will be for years, impracticable in the country districts of Haiti. [Careful observations of immediate and real hygienic value.]

H. M. H.

CRAIG (Charles F.). **The Diagnosis and Treatment of Latent Amoebic Infection.**—*Internat. Clinics*. 1929. Mar. 39th Ser. Vol. 1. pp. 77-94. [16 refs.] [Army Med. School, Washington.]

A very interesting review of the subject, in which the author states: The diagnosis of latent infections with *E. histolytica* which are accompanied by symptoms is made from study of the clinical history and picture and the results of cultural and microscopical examinations of the stools, together with result of the complement fixation test in selected cases, and in those without appreciable symptoms by demonstration of the parasite in the faeces. In the author's experience the symptomatology of latent *E. histolytica* infection is confined chiefly to digestive and nervous systems—although some authorities [*sic*] have described symptoms connected with the eye and other organs of special sense. In this paper symptoms, technique of diagnosis by microscopical and cultural examination of faeces, complement fixation test, and treatment receive exposition and discussion. Finally, the author insists that the majority of so-called "healthy carriers" of *E. histolytica* present symptoms due to this parasite, and that all cases must have definite lesions in the intestine caused by the parasite, even though microscopic in size. The finding of *E. histolytica* in the faeces of an individual demonstrates that he is infected with that parasite, and not necessarily that the parasite is the cause of the symptoms that may be present. That it is the cause can be proven only by treating the amoebic infection and observing the result upon the symptoms. [And on such proof in his hands the author claims to base his contentions.]

H. M. H.

ROSE (Werner J.). **Amoebic Dysentery in Western New York with a Report of Six Cases.**—*Bull. Buffalo General Hosp.* 1928. Dec. Vol. 6. No. 2. pp. 35-40. With 5 figs. [7 refs.]

The author notes that although amoebic dysentery appears to be rare in Western New York, there is reason to believe that many cases remain undiagnosed and it must be emphasized that its sporadic occurrence in northern climates is by no means an anomaly. The importance of examination of stools for amoebae in suspicious cases is obvious. Of eight cases occurring in Western New York since 1921, six are here reported in detail.

H. M. H.

BISHOP (Louis F.) & BISHOP, Jr. (Louis F.). **A Study of Amebiasis in New York City.**—*Amer. Jl. Trop. Med.* 1929. Sept. Vol. 9. No. 5. pp. 297-307. [6 refs.]

This study shows that endemic amoebiasis in New York City is not rare. The authors reached no conclusions as to its epidemiology. They believe more attention should be paid to the diagnosis of carriers of *E. histolytica* and especially to the technique of faeces examination.

H. M. H.

PANAYOTATOU (Angélique). Ueber einige Fälle chronischer Amöben-Enterocolitis bei Kindern. [**Chronic Amoebic Enterocolitis in Children.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 595-597. [1 ref.]

The author records her observations, in Alexandria, of chronic amoebic enterocolitis in children 4 to 10 years old. Mucosanguineous

diarrhoea alternates with constipation, the children are apathetic, and have no inclination for play. There is loss of appetite and of sleep. The stools reveal the cysts of the dysentery amoeba and sometimes free amoebae as well. Brief clinical descriptions are given of three typical cases. The author has obtained better results from treatment by stovarsol 0.15 gm. per os, combined with yatren "105" enemas, than by intramuscular injections of emetine. The former therapy was followed by rapid cessation of pain, disappearance of blood, mucus and parasites from stools, and recovery of normal mentality. Remissions of apparent good health were of months longer duration.

H. M. H.

BOINET, TURRIÈS & POURSIÈS. Quadriplegie à marche ascendante (par radiculo-nevrite) survenue à la suite d'une dysenterie des pays chauds traitée par l'émétine. [**Ascending Quadriplegia following Emetine-treated Dysentery.**—*Marseille-Méd.* 1929. Sept. 25. Vol. 66. No. 27. pp. 375-380. [2 refs.]]

This male patient had had malaria, and probably syphilis, and in May, 1928, severe dysentery and hepatitis in Saigon. In June liver puncture—250 cc. pus aspirated; then given 12 daily injections emetine [total quantity not stated]. This was soon followed by steadily increasing muscular weakness and atrophy, till at end of November quadriplegia was complete. Patient lay helpless in bed, able only with effort to turn on side. No loss or change of sensation; no trophic or circulatory changes in skin or joints. No loss of sphincter control. No sign of mesencephalitis nor of bulbar paralysis. Marked muscular atrophy and paralysis confined to arms, legs and buttocks. [No tenderness or pain of muscle recorded.] Complete loss of tendon reflexes. No hypertonicity and no contractures. No psychic changes. Wassermann positive in blood, negative in cerebrospinal fluid. [No record of cardiac function nor of electrical reactions.] In the end with no treatment other than symptomatic, gradual but complete recovery. It was noted that recovery of function directly followed recovery of muscle volume. The authors consider this a severe peripheral polyneuritis, due to action of toxins, especially of amoebae, but also of malaria and syphilis, perhaps aggravated by emetine, on the motor nerves. [But very much more like a case of emetine poisoning of muscle cells.]

H. M. H.

KHOURI (Joseph). Quelques observations relatives à l'amibiase en Egypte. [**Observations on Amoebiasis in Egypt.**—*Rev. Prat. Malad. des Pays Chauds.* 1929. Oct. Year 8. Vol. 9. No. 10. pp. 471-472, 475-477.]

The author [a Daniel come to much-needed judgment] subjects certain recorded cases of amoebiasis in Egypt to criticism informed and sustained by his own first-hand and lengthy experience of the exacting technique required for the actual demonstration of amoebae; a matter that, as he has recorded, has brought him into conflict on the very diagnostic point of what is an amoeba, with some of his colleagues. He puts it forward that vesico-renal and pulmonary (bronchitic) manifestations due to the dysentery amoeba must be extremely rare, notwithstanding the number of cases reported in Alexandria; for in five consecutive years of close attention to this question, during which he had examined a number of these cases, he had failed to find a single case in which amoebic origin could be shown.

Moreover, the absence in his laboratory of amoebae and of amoebic cysts, though searched for by methods "les plus accrédités," in specimens of urine and sputum, when other laboratories had found those parasites in numbers, or when the diagnosis of amoebiasis had been based on the clinical improvement following on emetine therapy—shows the confusions to which 'analystes' and clinicians have succumbed when they declare as amoebic pathological cases which have nothing in common with amoebiasis. The fact remains that in spite of the divers authors and the number and variety of their cases, none of these recorded cases of vesico-renal or bronchial amoebiasis had been investigated by "une technique impeccable et dans un esprit de rigueur scientifique." The practical consequences are doubly deplorable; for, on the one hand, too many clinicians, bothering little about "l'examen parasitologique," classify under the rubric 'amoebiasis' affections etiologically different, founding their diagnosis solely on the more or less favourable effect of emetine (whose physiotherapeutic action is far from being limited to amoebic infestation); and on the other, there results an inconsiderate and often unjustified use of emetine, subjecting the patient to a severe treatment, which may even be harmful.

H. M. H.

NO-LORANDOS & PANGALOS (G.). La dysenterie amibienne en Grèce. [**Amoebic Dysentery in Greece.**]—*Presse Méd.* 1929. Sept. 4. Vol. 37. No. 71. pp. 1152-1153.

In a brief note the authors record both the scantiness of Greek published observations on this subject, and their own observation from hospital and private practice that amoebiasis and amoebic dysentery is widespread in Greece, some of it recently imported and much of it endemic and probably of old time. In 560 examinations at the orphanage of the "Near East Relief" 208 amoebic carriers were found, of which 60 were characteristic *Entamoeba histolytica* cases, about 11 per cent. Approximately the same percentage of *E. histolytica* carriers obtained among their private patients.

H. M. H.

PAPPALARDO (Concetto). Nuove osservazioni sull' amebiasi in Sicilia. [**Further Observations on Amoebiasis in Sicily.**]—*Policlinico*. Sez. Prat. 1929. Sept. 9. Vol. 36. No. 36. pp. 1284-1287. [19 refs.] [Med. Clinic, Univ., Catania.]

It is now believed that amoebiasis is endemic in Sicily. During the period February, 1926-June, 1928, the author has met with a hundred cases. Forty of these were from Catania itself and 20 in the Province, 23 from Syracuse and 17 from Caltanissetta. In 84 of these *E. histolytica* was found alone, in the remainder with other protozoa, such as *Giardia* or *Trichomonas*, or helminths as *Ascaris* or *Taenia*. The commonest clinical type (in 73 cases) was a recurrent enterocolitis; other forms such as "dyspeptic," pseudoappendicular and acute dysentery were much rarer. In five instances metastatic hepatitis was recorded.

Warning is given against increasing the dose of emetine, as the author has seen fatal results therefrom. He gives only 2-4 cgm. subcutaneously for 4-6 days, followed by 0.25 gm. stovarsol twice daily for a fortnight; repeating both if necessary.

H. Harold Scott.

SNIJEDERS (E. P.). Autochtone amoeben-dysenterie in Nederland in verband met de epidemiologie dezer ziekte. [**Autochthonous Amoebic Dysentery in Holland and its Epidemiology.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. Dec. 14. 73rd Year. 2nd Half. No. 50. pp. 5834-5848. [18 refs.]

A case of amoebic dysentery occurring in an individual who had never been out of Holland forms the text of this lecture. The case is firstly set out for the audience, with the individual himself in attendance, in all the detail of onset, symptoms, diagnosis and treatment. It is the case of a young man, 25 years of age and a painter by occupation. In the second part of the lecture the author considers the course of the disease in this particular case, the microscopic examination of the stools, the development of the disease from onset and appearance of large *histolytica* forms in the blood stained mucus of a diarrhoeic stool to the stage of disappearance of symptoms and the appearance of *minuta* forms and cysts in a formed stool. The only medicament so far administered in this case has been emetine. Two questions present themselves for answer at this point. Is the patient really cured and why has he received no treatment with the highly esteemed yatren? The answer to the first of these questions is: Yes, clinically, but not protozoologically. He has become a healthy carrier of amoebae and a distributor of cysts to other hosts. The case was brought forward in order to show primarily the marked curative effect of emetine upon the disease process. In spite of treatment, however, the *minuta* forms of the amoeba can live as commensals on the mucus of the intestine. But the equilibrium of this commensalism can be upset. The amoebae may invade the tissue of the intestinal wall and pass into a *histolytica* form, with loss of cyst producing capacity. And thus it is that the patient is to be regarded as not only a distributor of infection but, in virtue of the continued presence of *minuta* forms, as a danger to himself. Endeavour then must be made to effect a protozoological and not merely a clinical cure of the patient. To bring this about he should now receive yatren treatment, the detail and difficulties of which are described.

How did this individual contract this so-called tropical disease? One fact of seeming importance is that he was accustomed to bathe frequently in water fouled with the dejecta of ships from the tropics. But other facts also bear on this case. In particular it was found that in the patient's family, consisting of father, mother and 8 children, the father, a brother and two sisters had also suffered from the disease. An analysis of the data renders it probable that the father was the first to become infected and that his infection also might be traced to bathing in specifically contaminated water. The family history therefore allows of the possibility of water infection and of contact infection. Is it to be inferred that all amoebic dysentery in Holland is in reality referable to a tropical source or to contact transmission arising out of such an original infection? If so, how is the infrequency of clinical dysentery as compared with the tropics to be explained, especially as the healthy carrier is by no means of infrequent occurrence? The questions are more easily put than answered.

There follows then the 3rd and final part of the article with treatment of the statistics of case and carrier frequency and of the question whether two distinct species of dysentery organism exist, morphologically alike, but one the harmless *Entamoeba dispar* of temperate zones and the other

the pathogenic *Entamoeba dysenteriae* of the tropics. The author finds little convincing evidence in the facts adduced for the existence of two distinct species. He takes up the subject of an original tropical source for all autochthonous dysentery of temperate climes. The adult male population of Holland should, on the data available, provide not less than 200,000 "carriers," even though actual cases are few. Would a survey show the distribution of such carriers concentrated around the ports of the country and diminishing in numbers in the interior? An investigation on these lines would be interesting, but would perhaps be more fruitful if carried out in Germany than in a country like Holland, which for so many centuries has been connected through its ports with the tropics. The author throughout the article has raised many points of which this summary has selected but a few. He concludes with the remarks that there is no end to the questions which might be asked on this subject and that much work still requires to be done for their elucidation.

W. F. Harvey.

REVUE PRATIQUE DES MALADIES DES PAYS CHAUDS. 1928. June-July. Year 7. Vol. 8. No. 6-7. pp. 295-368. [21 refs.]
Numéro consacré à l'amibiase. [**Amoebiasis.**]

This number contains nine papers concerning various forms of illness which the respective authors attribute to amoebic infection—but in most cases on grounds not convincing to everyone and the references are to papers no more convincing.

H. M. H.

PETZETAKIS (M.). De la réalité de la cholécystite amibienne. [**The Reality of Amoebic Cholecystitis.**]—*Ann. de Méd.* 1929. June. Vol. 26. No. 1. pp. 66-90. With 4 text figs. [56 refs.]
——. Les formes cliniques de la colecystite amibienne.—*Arch. Ital. Sci. Med. Colon.* 1929. July 1. Vol. 10. No. 7. pp. 293-315. With 3 text figs. English summary p. 316. [Greek Hosp., Alexandria, Egypt.]

In this long paper, various clinical types of 'amoebic' cholecystitis as observed by the author, are fully described: and possible routes of infection of gall bladder are discussed. The author's claim to be the first (1924) to describe this 'amoebic' cholecystitis has not been challenged. He gives many references to previous publications of his on the subject—and to the papers of those (hitherto few) others who also and later have observed 'amoebic' cholecystitis; and to the papers of some others on amoebiasis in general: but to the work of none of those of unquestionable competence and experience who have insisted on parasitological proof for any and all amoebiasis, and pointed out the only means by which that proof can be obtained, and errors in diagnosis avoided. To ignore their work is at this date become disreputable. It is not therefore surprising that the author can "conclude" that the existence of amoebic cholecystitis has been proved by direct demonstration of the amoebae in the pus from the gall bladder; in the vomited bile; or in the fluid recovered by duodenal intubation: moreover, and also, by the rapid and satisfactory effect on clinical symptoms and local signs of specific [emetine, arsenicals] treatment.

[A leading example of the fanciful "amoebiasis" that has now become extremely boring. In fact, no parasitological proof whatsoever of the amoebic nature of this cholecystitis has yet been put forward by the author nor by any one of his supporters—nor have they yet shown any awareness of what such proof might be. And only restricted acquaintance with the clinical effects of the 'specific' drugs enables the claim of 'proof by specific therapy' to be entered.]

H. M. H.

SFAMENI (M.). Esiste una colecistite amebica primaria? [**Is there such a Condition as Primary Amoebic Cholecystitis?**—*Riforma Med.* 1929. Nov. 16. Vol. 45. No. 46. pp. 1547–1551. [20 refs.] [Inst. of Path. & Clin. Med., Univ., Messina.]

This, though short, is a well-reasoned paper. The author discusses the possible routes by which *Entamoeba histolytica* could reach the gall-bladder. Those who believe in amoebic cholecystitis base their diagnosis on: (1) The signs of cholecystitis in a patient suspected or proved to have dysentery; (2) Finding of *Entamoeba* in the fluid extracted by the duodenal sound; (3) The effects of emetine and stovarsol. The author quotes cases to show that signs of cholecystitis may exist in amoebic hepatitis with the gall-bladder unaffected; and concludes that primary amoebic cholecystitis is not an entity, apart, that is, from hepatic disease.

H. Harold Scott.

MARWITS (E. L.) & VAN STEENIS (P. B.). Een geval van amoebiasis cutis na de incisie van een pericoecaal abces (Phagédénisme cutané amibien). [**A Case of Cutaneous Amoebiasis after Incision of a Pericoecal Abscess.**—*Geneesk. Tijdschr. v. Nederl.-Indië* 1929. Oct. 1. Vol. 69. No. 10. pp. 950–957. With 1 fig. & 1 chart on 2 plates. [16 refs.]

After the incision of a slowly developed, apparently appendicular abscess, a quickly spreading ulcer formed itself round the wound. All therapeutical efforts remained futile until amoebae of the histolytic type were discovered in the pus (abundantly on the edge of the ulceration) and prompt recovery followed the administration of a course of emetine injections and stovarsol per os. The literature is briefly quoted and the pitfalls of the diagnosis are discussed. No reasonable doubt appears justified as to the correctness of the diagnosis in the authors' case.

W. J. Bais.

BARRETT (J. H.). **Radiological Examination of the Liver in Cases of Suspected Amoebic Abscess.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 375–376.

The author declares that a perusal of "the more recent text books which deal with tropical diseases reveals the fact that the radiographic diagnosis of amoebic abscess has scarcely been considered at all."

In this interesting paper the matter is duly considered, and actual clinical cases are cited. The diaphragm range is measured on the screen with a compass. The trunk-vertical position is the best. The fluoroscopic part of the examination need not take more than a few minutes: an opinion, however, cannot be given on fluoroscopy alone. Skiagrams are essential. In fluoroscopy use an electric current of 3 m.a. Larger currents are unnecessary and may give rise to screen-lag.

A diagnosis of liver abscess, doubtful on clinical signs alone, may be cleared up on X-ray examination; when also presence or absence of lung complications may be indicated, and prognosis assisted. Cases of hepatitis negative to amoebic abscess radiographically usually yield to non-operative measures—emetine, etc. In the author's experience no case where X-ray evidence was wholly negative has subsequently been proved to have been a case of abscess of liver.

H. M. H.

COSTANTINI (Henri). Pour la suture primitive dans le traitement chirurgical des abcès amibiens du foie. [**Primary Suture in the Surgical Treatment of Amoebic Liver Abscess.**]*—Presse Méd.* 1929. Nov. 20. Vol. 37. No. 93. pp. 1511–1512.

The author pays tribute to the value of emetine (ROGERS 1912) in reducing mortality of amoebic liver abscess from 50 to 4 per cent. He cites his own series of cases (22—one death) in support of his contention that primary suture after operation is of advantage. Stitches are removed on 10th day and cure is then complete, in contrast to the average two months of dressings and convalescence after open drainage, with its risk of secondary infection of abscess cavity. Primary suture can be done if—and this point is stressed—microscopical examination of the pus obtained at operation reveals no bacterial infection. The author, however, acknowledges that many cases of amoebic liver abscess can be cured by simple aspiration and emetine injections [and it can be inferred from his paper, though it is not definitely stated, that he administers emetine to the cases he treats by open operation and primary suture].

H. M. H.

i. CONNELL (W. Kerr). **An Unusual Complication of Liver Abscess.** *—Kenya & East African Med. Jl.* 1929. Oct. Vol. 6. No. 7. pp. 195–197.

ii. McNABB (J.). **Case of Liver Abscess in a Native.**—*Ibid.* pp. 197–198.

i. A full record of a rare complication of liver abscess. The condition appeared to be one of early duodenal obstruction due to kinking of the gut as result of adhesions caused by the perihepatitis associated with the original liver abscess, 4 months previously. By pressure on abdomen the patient was able to overcome the obstruction mechanically. Operation disclosed that obstructional dilatation was limited to the first part of the duodenum—doubtless ultimately dilatation of stomach would have occurred. Recovery was rapid and uneventful.

ii. The patient had had dysentery; but examination of faeces revealed only tapeworm eggs: fever every evening; liver and spleen enlarged: constant tenderness on pressure in right eighth intercostal space in mid-axillary line. No rigors nor sweating. Total leucocyte count 22,400—general increase not of polymorphs alone. Slight haemoptysis on one occasion. Emetine grain 1 hypodermically daily for one week brought temperature to subnormal; and spleen decreased nearly to normal size; but no change in liver. Aspiration with needle at tender intercostal point; less than 1 pint pus; liver decreased then to normal size. Emetine therapy resumed.

H. M. H.

ACTON (Hugh W.) & CHOPRA (R. N.). **Kurchi Bismuthous Iodide, its Value in the Treatment of Chronic Amoebic Infections of the Bowel.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 481-487. [16 refs.]

A fully described research of immediate importance. The authors state that their experience in the use of the total alkaloids of Kurchi bark in the treatment of acute and chronic amoebic infections of the bowel justifies them in the following conclusions:—

"(1) In the laboratory, and to a greater extent clinically, the total alkaloids of kurchi bark are far superior to emetine.

"(2) The kurchi alkaloids can be given in large doses, and so far no depressant, emetic, or irritative effects have been observed by us. They are much less toxic than emetine.

"(3) Intramuscular injections of 2 grains of the total alkaloids cause transient hyperaemia and oedema; this is not visible to the eye unless the dose is injected subcutaneously, and the swelling passes off in 24 to 48 hours. Injections should be used for acute cases of amoebic dysentery.

"(4) The kurchi bismuthous iodide can be given orally in 10-grain doses twice a day for 10 days without any deleterious effects.

"(5) In chronic amoebic colitis, 4 grains of kurchi bismuthous iodide given orally twice a day for ten days cured 12 out of 18 cases, compared with one out of every two with emetine bismuthous iodide.

"(6) Intramuscular and oral administration of the total alkaloids of kurchi bark cure non-suppurative hepatitis; their action on suppurative amoebic hepatitis has still to be investigated.

"(7) The administration of the total alkaloids of kurchi bark, instead of conessine only, means a larger yield of the drug, and therefore cheapness in production."

H. M. H.

VAN DEN BRANDEN (F.). Essai de traitement de l'amibiase intestinale par le Rivanol. [**Treatment of Intestinal Amoebiasis by Rivanol.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. June 30. Vol. 9. No. 2. pp. 185-190. [7 refs.]

The author gives brief clinical records of 6 cases of dysentery (*E. histolytica* present in stools) in natives treated by rivanol. Three benefited. In the other three no improvement followed, and entamoebae did not disappear from stools.

H. M. H.

JONES (P. H.) & TURNER (R. H.). **Iodoxyquinolin Sulphonic Acid in the Treatment of Amebic Dysentery.**—*Jl. Amer. Med. Assoc.* 1929. Aug. 24. Vol. 93. No. 8. pp. 583-586. [19 refs.]
[School of Med., Tulane Univ. of Louisiana, New Orleans.]

Following up their previous paper [see this *Bulletin*, Vol. 24, p. 12] the authors now report results of treatment by iodoxyquinolin sulphonic acid (Yatren) of a further 64 patients. 42 gm. constituted a course of treatment. Observation of the cases extended for from one to three years. The drug is simple to administer and is without danger. One patient, who received one-third the proper dose, did not experience any relief from dysentery. In another who had dysentery with cutaneous amoebiasis, the dysenteric symptoms were controlled, but the cutaneous ulceration continued to show amoebae after considerable treatment. In all the remaining cases there was a prompt and satisfactory response to treatment. The response of children receiving

doses in proportion to age was similar to that of adults. There were no dietary restrictions. No toxic manifestations were noted. Stools of ten patients were examined for cysts some time after the completion of treatment and nine were negative.

Thirty-five patients, or 90 per cent. of those with a satisfactory follow-up, were symptom-free from one to three years after treatment—an average of twenty months. The remaining 10 per cent. (or 4 patients) either had a relapse with proved amoebic dysentery or showed encysted amoebae in the stools. Further treatment with yatren was apparently efficacious.

H. M. H.

DOBELL (Clifford) with the co-operation of BISHOP (Ann). **Researches on the Intestinal Protozoa of Monkeys and Man. III. The Action of Emetine on Natural Amoebic Infections in Macaques.**—*Parasitology*. 1929. Nov. Vol. 21. No. 4. pp. 446–468. With 1 chart in text. [21 refs.] [National Inst. for Med. Research, Hampstead, London.]

A very interesting research conducted with rigorous care. Five tame monkeys (3 *Macacus sinicus*, and 2 *M. rhesus*) were treated with emetine bismuth iodide per os, in order to study the effects of the alkaloid upon their intestinal amoebae (and other protozoa). These monkeys were originally infected with *Entamoeba histolytica* (large and small strains), *Entamoeba coli*, *Endolimax nana*, *Enteromonas* (= *Tricercomonas*), and *Giardia*. The treatment ultimately eradicated the *E. histolytica* infections from four out of five animals, but did not remove any of their other intestinal protozoa.

It was found necessary to administer 60 mgm. of emetine bismuthous iodide daily for about a week to a macaque weighing about 5 kgm. in order to eradicate an infection with *E. histolytica*. Such dosage was toxic to four of the five monkeys used.

The general conclusion drawn by the authors is that emetine affects the various intestinal protozoa of *M. sinicus* and *M. rhesus* exactly as it does the comparable species in man; and it is suggested that macaques can therefore be utilized—if methods similar to the authors' be employed—in place of men in future chemotherapeutic experiments to discover remedies for human amoebic dysentery.

H. M. H.

BISHOP (Ann). **Experiments on the Action of Emetine in Cultures of *Entamoeba coli*.**—*Parasitology*. 1929. Nov. Vol. 21. No. 4. pp. 481–486. [5 refs.] [National Inst. for Med. Research, Hampstead, London.]

Two pure strains of *Entamoeba coli*, differing in their accompanying bacterial flora and experimental history, but identical morphologically, have been tested with emetine hydrochloride *in vitro*. In a buffered and wholly liquid medium, with a pH varying between 6·8 and 7·2 emetine hydrochloride was found to be toxic to *E. coli* in dilutions between 1 : 300,000 and 1 : 600,000, the toxicity increasing with the alkalinity of the medium. It is therefore concluded that emetine is about 16 times as toxic *in vitro* to *E. histolytica* as it is to *E. coli*.

H. M. H.

TRIPOLI (Carlo J.). **A Study of Stools cultured for *Entameba histolytica* for Diagnostic and Other Purposes.**—*Amer. Jl. Med. Sci.* 1929. Dec. Vol. 178. No. 6. pp. 822-833. [12 refs.] [Med. School, Tulane Univ. of Louisiana, New Orleans.]

Results of this investigation* lead the author to conclude that bacterial flora exert a very important influence on initial and later growth of amoebas in culture. It does not seem feasible to eliminate the accompanying bacteria entirely. There are multiple factors, each playing its own role, causing death of the amoebas in culture. Immunological reactions possible with cultured amoebas, and their extracts, promise valuable aid in diagnosis. His cultural method of stool examination for presence of *E. histolytica* was equal to any laboratory means of diagnosis, and may eventually prove superior to direct microscopy. In public health work the culture method would result in much saving of time and personnel in detection of *E. histolytica* carriers. From study of 258 private and dispensary patients, and medical students, it is estimated that incidence of *E. histolytica* infection in Louisiana is a little below 7 per cent.

H. M. H.

FRIEDRICHS (Andrew V.) & HARRIS (William H.). **Cultivation of *Entameba histolytica* from a Hepatic Amoebic Abscess.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Nov. Vol. 27. No. 2. pp. 90-91. [3 refs.] [Med. College, Tulane Univ., New Orleans.]

The authors note that cultures from intestine may present a varied assortment of non-pathogenic amoebae. Thus about many of the reports of cultures there exists doubt as to the species of cultivated amoeba. Further DOBELL (1927) reports cultivation of an amoeba from different types of monkeys which he declares not to be differentiated from *Entameba histolytica* of man—of much importance in the consideration of experimental transmission of *E. histolytica* to such types of anthropoid animals. There is, however, very remote likelihood of an assortment of amoebae in the liver lesion.

The authors' patient suffered from amoebic dysentery and liver abscess. Liver pus obtained at operation revealed in stained smears and by culture no bacteria. The patient died 24 hours after operation. Fresh material scraped from liver abscess wall at autopsy (12 hours after death) showed many actively motile amoebae, identified by staining by Heidenhain's iron haematoxylin method. Cultures of this material were prepared in Dobell's modification of Boeck-Drbohlav medium. In some tubes the amoebae grew freely—30 generations in 5 months. Study of iron haematoxylin stained specimens revealed morphological features of *histolytica* species. The primary amoebic cultures made post-mortem from scrapings of liver abscess wall showed contamination, for most part with colon group bacteria. Bacterial invasion had therefore occurred post-mortem.

H. M. H.

* This paper opens with half a page which is practically a verbal transcript from DOBELL and LAIDLAW (*Parasitology*, 1926, Vol. 18, p. 283). Later, under the heading "Differentiation of Pathogenic and Non-pathogenic Amebas Cultured," there is a transcript of two pages from St. JOHN (*Amer. Jl. Trop. Med.*, 1926, Vol. 6, p. 319) and later, another page-long transfer from DOBELL and LAIDLAW (*loc. cit.* p. 307). In each instance there is nothing to indicate that the passages in question are transcripts. The citing of these authors' papers in the Bibliography at the end cannot atone for these acts of plagiarism.—Ed.

HARRIS (William H.) & FRIEDRICHS (Andrew V.). **Injection into the Rabbit of Cultures of *Entamoeba histolytica*.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Nov. Vol. 27. No. 2. pp. 91–93. [4 refs.] [Med. College, Tulane Univ., New Orleans.]

The authors using as inoculum a culture of *E. histolytica* from a hepatic abscess [v. this *Bulletin* above] have failed to infect rabbits by injection of inoculum into mesenteric veins, directly into liver substance, or into marginal ear vein.

They note that the rabbit may not be susceptible to this infection.

H. M. H.

PONS (R.). Essais de mise en culture d'*Entamoeba dysenteriae* en partant du pus d'abcès hépatique d'origine amibienne. [**Attempts to cultivate *E. dysenteriae* from Hepatic Abscess.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 768–770. [6 refs.]

Records the author's failure to cultivate *E. histolytica* from the pus of liver abscess. Conditions for success appeared favourable, for in the liver pus (obtained by surgical intervention) of each of 5 cases of hepatic abscess many actively moving haematophagous amoebae were found, and their nature determined by wet fixation and differential staining with iron haematoxylin. In two cases there was bacterial contamination of the pus; in the other three it was bacterially sterile. The amoeba-bearing pus was sown on to medium proved to be successful in cultivation of *E. histolytica* from faeces, and the temperature and pH conditions were exactly those which experience had shown to be right for that cultivation. The anaesthetic given the patients (ether and chloroform) could be ruled out, for the amoebae in the pus remained active for several hours after the pus was drawn from the patient. The author suggests that the amoebae in (and from) intestine are not strictly adapted to parasitism; hence their cultivation is easy in comparison with amoebae from liver tissue which are probably strictly adapted to parasitism. In support he notes how seldom *E. histolytica* in culture is phagocytic of red blood cells; they have lost parasitic qualities.

H. M. H.

TANABE (Misao) & CHIBA (Eiichi). [**On a New Method of Cultivation of Dysentery Amoeba.**]—*Tokyo Iji-Shinshi (Tokyo Med. News)*. 1928. Aug. No. 2586. [Summarized in *Japan Med. World*. 1928. Dec. 15. Vol. 8. No. 12. p. 325.]

The medium slant consists of mixture of Ringer's solution (NaCl 9.0, CaCl₂ 0.2, KCl 0.2, Aq. dest. 1000); agar-agar 10 gm.; asparagin 1.0 gm. Ringer's solution and 5 per cent. rabbit's serum is added—just up to the top of the slant. Immediately before inoculation the medium is sterilized at 160–180° C. for one hour; and to 2 or 3 platinum-loopfuls of rice powder are added. The medium is then warmed in incubator at 37° C., inoculated with platinum loopfuls of infected faeces, and cultivated at 37° C. In this medium the amoebae live and proliferate vigorously for 12–14 days. The pH of the medium at the beginning is 7.8, but with proliferation of amoebae it becomes 6.4. Sub-inoculations proved successful.

H. M. H.

CRAIG (Charles F.). **The Technique and Results of a Complement Fixation Test for the Diagnosis of Infections with *Entamoeba histolytica***—*Amer. Jl. Trop. Med.* 1929. Sept. Vol. 9. No. 5. pp. 277–296. [14 refs.] [Army Med. School, Washington.]

The author fully describes his preparation of the alcohol extract of amoebic antigen and the exacting technique of the test proper. He

warns that the test requires a trained serologist, as the use of the undiluted alcoholic extract of *E. histolytica* (cultures) as antigen, renders the test one subject to extreme error unless the exact technique be followed. Results, moreover, ought to be checked by cultures and examination of faeces by one competent in the differentiation of the various species of amoebae occurring in man's intestine. As the antigenic extract used in this test was prepared from cultures of *E. histolytica*, which were in fact, mixed cultures of that parasite and various bacteria, the author prepared antigen extracts in like manner of the bacteria growing in the cultures, both aerobic and anaerobic, and used them as controls.

623 blood sera from as many individuals were tested, checked in each instance by microscopical and cultural examination of the respective faeces for *E. histolytica*. 67 (10·7 per cent.) gave a positive (three or four plus) reaction, and 556 (89·2 per cent.) gave a negative reaction. Of the 67 positives, the faeces examination revealed *E. histolytica* in 61 (91 per cent.), and none in 6 (8·9 per cent.). Clinically, over 60 per cent. of the serum positives presented clinical symptoms that may have been caused by *E. histolytica* infection. Disappearance of *E. histolytica* after appropriate treatment was followed by disappearance of symptoms, and in 3 to 6 weeks by conversion of serum reaction from positive to negative.

Of the 556 serum negatives, faeces were found positive for *E. histolytica* in 5. Of these one had severe symptoms of amoebic dysentery, one was a case of amoebic hepatic abscess, two had slight symptoms which may have been caused by the parasite, and one was a "healthy carrier." In 121 of the individuals giving negative serum reaction (21·7 per cent.) some species of amoeba other than *E. histolytica* was present in faeces; it was evident, therefore, that these other amoebae do not cause a positive serum reaction, and this was found true also of intestinal flagellates. Further observations [here reported fully] served to show that in rare instances cases giving positive Wassermann and Kahn test would also give positive reaction with this test. The author states that in patients giving such reactions, and in whom *E. histolytica* cannot be demonstrated in the faeces, the positive reaction with this test should not be regarded as diagnostic.

"Clinically, and as checked by the microscopic and cultural examination of the feces, the test would appear to possess a high degree of specificity and its use in hospital practice has proven its value, time and again, in demonstrating amoebic infections that would otherwise have remained unrecognized."

H. M. H.

GEMAR (Frank). **Effects of Bacteriophage upon Cultures of *Entamoeba histolytica*.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Nov. Vol. 27. No. 2. pp. 95-97. [3 refs.] [Med. College, Tulane Univ. & Lab. of the Veteran's Hosp. 84, New Orleans.]

Though varying amounts of a bacteriophage of considerable potency were introduced into the amoebic cultures, in no instance was interference with the amoebic growth manifested. Definite inhibition of bacterial growth was often demonstrated, but for a short time only; bacterial growth recovered and became even luxuriant. It is to be noted, however, that the phage had been proved potent for bacteria other than those predominating in the amoebic culture.

H. M. H.

CHEREFEDDIN (Osman). Eine neue Methode zur Konservierung der Amöben. [**A New Method for Preservation of Amoebae.**—*Deut. Med. Woch.* 1929. June 28. Vol. 55. No. 26. pp. 1084-1085.]

The longer stools are kept before examination, the greater the difficulty in finding and identifying amoebae in them, an unavoidable disadvantage where samples of stools have to be sent to distant laboratories for examination. The author has found Bouin solution an excellent preservative. It consists of formalin 40 per cent., 10 gm.; acetic acid 2 gm.; aq. dest. 30 gm.; picric acid to saturation. 0.5-1 cc. of this solution is well mixed with 3-5 cc. of stool, preferably the blood and mucus in the stool; the container, or test-tube, can be closed by rubber or ordinary cork. In this mixture the amoebae retain their form for over 10 days; endo- and ectoplasm, and nuclear structure remain distinct; furthermore, they can be stained with iron haematoxylin.

H. M. H.

OGAWA (Juntaro). Ueber die Reaktion der Gewebe. IV. Mitteilung: Studien ueber intrazelluläre Wasserstoffionenkonzentration der *Entamoeba histolytica* und *Entamoeba coli*. [**Intracellular H Ion Concentration of *E. histolytica* and *E. coli*.**—*Zent. f. Bakt.* I. Abt. Orig. 1929. Sept. 28. Vol. 114. No. 1/2. pp. 68-81. [7 refs.] [*Med. Clinic, Imperial Univ., Tokyo.*]

The technique of this painstaking research, and its results, are carefully and fully set out in a long paper, which cannot usefully be summarized. Its interest appears chiefly to be for those austere, and still esoteric, circles of cytologists and parasitologists whose bent and habit is bio-chemical, on whom, however, are placed the modern hopes of hygienist and clinician.

H. M. H.

SCHRUMPF-PIERON. Die chronische, periodisch aufflackernde Amöben-Hepatitis. [**Chronic, Periodically Relapsing, Amoebic Hepatitis.**—*Klin. Woch.* 1929. Aug. 13. Vol. 8. No. 33. pp. 1542-1543.]

An interesting account breaking no new ground.

H. M. H.

GASTON, OLMER (Jean) & AMÉDÉO. Cirrhose amibienne avec ascite hémorragique terminale. [**Amoebic Cirrhosis with Terminal Haemorrhagic Ascites.**—*Marseille-Méd.* 1929. June 25. Vol. 66. No. 18. pp. 876-877.]

The diagnosis in this case was clinical.

H. M. H.

BACILLARY DYSENTERY.

CHARLES (J. A.) & WARREN (S. H.). **Bacillary Dysentery in an Industrial Area.**—*Lancet.* 1929. Sept. 21. pp. 626-631. [11 refs.]

The authors describe fully clinical, epidemiological, pathological and bacteriological observations on 111 positive and 80 suspected cases of dysentery admitted to the Hospital for Infectious Diseases, Newcastle-upon-Tyne between March, 1928, and June, 1929. From consideration of these data they conclude that bacillary dysentery is a relatively common disease. Their experience, together with that of NABARRO and Glasgow and Aberdeen observers, suggests that in

certain areas it is undoubtedly endemic. Mild, severe, and fatal cases are all to be met with; they conform to the classical types of the disease. Its seasonal incidence is not limited to the warmer months of the year; and for this reason and because of its low attack rate and still lower mortality rate among children under 2 years old, it does not appear to have any definite association with the infective summer diarrhoea of infants. Six different organisms belonging to Flexner, Sonne, and Newcastle groups of dysentery bacilli were found associated with the disease. It is not improbable that in other areas the prevailing types may be different.

H. M. H.

TRABAUD, KHAÏAT (Hamdy) & SABBAGH (Abdel-Kader). La dysenterie bacillaire en Syrie. [**Bacillary Dysentery in Syria.**—*Rev. Prat. Malad. des Pays Chauds*. 1928. Oct. Year 7. Vol. 8. No. 10. pp. 515-521.]

The authors give clinical and bacteriological data of five cases of dysentery. They conclude that bacillary dysentery in Syria occurs more often sporadically than in epidemics. The infection is that of Flexner type bacterium; it is not imported, for the common bacillary dysentery of France is due to Shiga type bacterium, and when exceptionally due to a Flexner type is not a severe illness, in contrast to what occurs in the Levant. The illness as observed in Syria is severe, due to unusual toxic properties of the Flexner bacterium. As introduction the authors state that it is unquestionable that amoebic infection accounts for the great majority of cases of dysentery in Syria. [This is, however, questionable.]

H. M. H.

VIEIRA (F. Borges). Das dysenterias na cidade de S. Paulo. [**Dysentery in S. Paulo.**—*Sciencia Med.* 1929. Dec. Vol. 7. No. 12. pp. 609-632. With 1 map & 6 charts. [Hyg. Inst., S. Paulo.]

In this article the author takes up the detailed study of 133 cases, of which the facts are known and where the mortality was 24.06 per cent., according to geographical distribution, age, segregation, nationality, sex and origin of infection. He concludes that dysentery is endemic in S. Paulo, and that much improvement could be brought about by notification of all cases of suspicious diarrhoeas.

W. F. Harvey.

HAY (Hilda R.). **Fatal Epidemic Enteritis due to *B. dysenteriae* Sonne: a Preliminary Report.**—*Glasgow Med. Jl.* 1930. Jan. Vol. 113. No. 1. pp. 25-28. [11 refs.]

This preliminary report is based on an outbreak of acute enteritis in a hospital, and is to be fully dealt with later in another journal. It adds one more to the accounts of Sonne dysentery infection in Great Britain and was remarkable on account of the high fatality rate with which it was associated.

W. F. Harvey.

ABRAHAM (G.). Besonderheiten der Dysenterie Kruse-Sonne im Kindesalter. [**Peculiarities of Kruse-Sonne Dysentery in Children.**]—*Monatssch. f. Kinderheilk.* 1929. Dec. Vol. 45. No. 5. pp. 385-393. With 2 curves. [6 refs.] [Children's Clinic, Univ., Frankfurt a. M.]

Seventy cases were available for study, and in only 3 of these were bacilli not found. Agglutination tests are not of much value in diagnosis, as the reaction is slight with either of the two colony forms exhibited by this organism. A diagnosis of dysentery can be made from inspection of the stools alone, which show blood and abundant mucus. A very important difference has been found in regard to the disease as it occurs in infants and young children respectively. The former, except for a typical dysentery stool, show no severe symptoms: there is practically no elevation of temperature and no toxic manifestations. Young children, on the other hand, present a typically severe onset with temperature rising to 38°-40° C. (100.4° to 104° F.); it falls on the following day, after the administration of castor oil, to normal. Toxic symptoms in the shape of unconsciousness, convulsions and delirium are present. These toxic manifestations have disappeared by the second day and the further course is always satisfactory.

W. F. Harvey.

JUNIOR (Martinho da Rocha). Considerações clinicas sobre as dysenterias bacillares no lactente e na primeira infancia. [**Clinical Observations on the Bacillary Dysentery of Infancy.**]—*Brasil-Medico.* 1929. July 13. Vol. 43. No. 28. pp. 787-795. [3 pages of refs.]

A questionnaire was issued, designed to ascertain the technique of faeces examination, the treatment of dysentery including serotherapy, vaccinothrapy, bacteriophage therapy and dietetic treatment. A difficulty arose as to what was to be called dysentery. The disease caused by Shiga-Kruse and Flexner organisms is well defined, but there is a large confused group besides, ascribed to pseudo-, para-, meta-dysentery organisms, etc., and there are the diseases associated with the presence of bacilli of Hiss Russell, Schmidt, Harris, Strong, Morgan, etc. Reference is made to the possible modes of spread of dysentery by flies and by temporary or permanent carriers, and by healthy carriers. Prognosis depends less on the nature of the germ than on the severity of the symptoms: Shiga dysentery may be benign, while the less toxic organisms may give rise to severe cases. The subject of treatment is discussed at some length, both symptomatic and specific treatment. Serum treatment has its special use where toxic symptoms are present—tachycardia, muscular twitching, hyperpyrexia, slow deep respiration, somnolence, etc. Vaccinothrapy, autovaccinothrapy, oral and rectal administration of vaccines are referred to, as are also bacteriophage and protein therapy.

W. F. Harvey.

CASTELLANI (Aldo). "**Metadysentery,**" with Remarks on a Chronic Type.—*Lancet.* 1929. Aug. 24. pp. 370-372. [12 refs.]

The bacteriological description of the "metadysentery" species of bacilli has been given in numerous papers by the author. In this

paper attention is again drawn to the chronic type of the disease, "characterized by recurrent attacks of simple diarrhoea with absence or occasional presence of dysenteric symptoms."

W. F. Harvey.

BIGGAM (A. G.). Peripheral Neuritis as a Complication of Bacillary Dysentery associated with Treatment by Antidysenteric Serum.—*Jl. Roy. Army Med. Corps.* 1929. Nov. Vol. 53. No. 5. pp. 367–371. [5 refs.]

As introduction the author refers briefly to the work of various authors who have recorded polyneuritis in the course of bacillary dysentery or in convalescence from bacillary dysentery; and also polyneuritis following administration of antidysenteric sera.

The present case was that of a male, 35 years old, suffering from mucosanguineous diarrhoea, pain, tenesmus. He had had similar yearly attacks for the previous 5 years. Flexner type dysentery bacterium was isolated from stools, and the patient's blood agglutinated that organism. Nothing abnormal noted in nervous system. Stools negative for cysts and vegetative forms of *E. histolytica*. Sigmoidoscopy showed rectum and pelvic colon diffusely red, congested, inflamed, muco-pus sticking to gut wall. Treatment—diet; soda sulph.; antidysenteric serum intramuscularly, 100 cc. first day, 60 cc. on each of four following days. Dysentery symptoms disappeared, but 8 days after admission to hospital patient complained of numbness in feet, which spread to knees, with pain and tenderness in calves. Five days later loss of superficial sensation up to knees and knee and ankle jerks absent; marked weakness of legs. No plantar response. No bladder or bowel trouble. Abdominal and cremasteric reflexes present. In upper limbs, only numbness of finger tips. Skin of feet, especially soles, became very glossy and sweated profusely. No urticaria or joint pains developed. 100 cc. antidysenteric serum diluted with saline was given intravenously, followed by 80 cc. by same route on each of next two days. No reaction. Sensation began to return in legs; finally, complete recovery, with no sign of neuritis.

The author's opinion is that the rapid improvement in the peripheral neuritis that followed on large doses of antiserum intravenously indicates that the neuritis was result of the dysentery toxins, and not of the antiserum given in the early stages of the acute bowel condition.

H. M. H.

COMPTON (Arthur). Antidysentery Bacteriophage in the Treatment of Bacillary Dysentery. A Record of Sixty-Six Cases treated, with Inferences.—*Lancet.* 1929. Aug. 10. pp. 273–275. With 2 text figs. [8 refs.]

The therapeutic phage was prepared by putting up a mixture of 4 phage strains against 16-hour broth cultures of 2 Shiga, 3 Flexner, 6 Hiss (including one Sonne) and one Gay strain. Complete lysis was attained in a few hours at 37° C. The lysates, after 24 hours' incubation, were mixed, filtered through infusorial earth and an L3 Chamberland candle, and distributed in ampoules in quantities of 2 cc. Each patient received 3 ampoules and a circular of instruction on the use of the phage. Returns, which could be used, were obtained in 66 cases and showed that the results were very good in 35, good in 10, moderately good in 6, a partial failure in 10.

W. F. Harvey.

- CLAYTON (F. H. A.) & WARREN (S. H.). **A Further Study of an Unusual Bacillus recovered from Cases presenting Symptoms of Dysentery.**—*Jl. Hygiene*. 1929. July. Vol. 29. No. 2. pp. 191–200. [6 refs.] [College of Med., Univ. of Durham, Newcastle-upon-Tyne.]

The occurrence of this bacillus in cases of dysentery has already been described [see this *Bulletin*, Vol. 26, p. 894]. It has been found in two further cases. An investigation into the specific characters of this associated organism strengthens the impression that it is a hitherto unrecognized dysentery bacillus, which the authors propose to call the "Newcastle dysentery bacillus."

W. F. Harvey.

- CALALB (G.). Sur la variabilité microbienne au cours d'une infection (dysenterie bacillaire). [**Variability of the Dysentery Bacillus in the Course of the Disease.**]—*C.R. Soc. Biol.* 1929. Oct. 18. Vol. 102. No. 26. pp. 162–164.

Two cases of dysentery were treated, the one with antidysentery serum, the other with antidysentery bacteriophage. In both cases the strain of bacillus isolated showed marked change with the institution of the particular treatment.

W. F. Harvey.

- HILGERS (Paul). Ueber E-Ruhr-(Kruse-Sonne-) Bazillen. [**E-Dysentery (Kruse-Sonne) Bacilli.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Oct. 31. Vol. 114. No. 4/6. pp. 320–333. With 1 text fig. [35 refs.] [Reich Health Office, Berlin-Dahlem.]

The importance now attached to the type of dysentery bacillus which goes by the name of the Sonne bacillus has also brought into more prominence the series of so-called pseudodysentery bacilli which were previously differentiated by KRUSE and his co-workers: these were not distinguishable by simple agglutination tests, but were differentiated by means of serum-absorption tests and were given the name letters A to H, with the addition later of the J type (Schmitz bacillus). In this series the E-type of Kruse has been found to be identical with the Sonne bacillus.

An investigation has been made by the author of the distinguishing characters of the Kruse-Sonne bacillus which are set out in this paper in detail.

W. F. Harvey.

- DE ASSIS (A.) & MENDES (Nelson O.). Estudos sobre o bacillo para dysenterico de Kruse-Sonne. [**Studies on the Paradyentery Bacillus of Kruse-Sonne.**]—*Brasil-Medico*. 1929. Aug. 31. Vol. 43. No. 35. pp. 1031–1037. With 6 text figs. [33 refs.]

The authors review the work done on the Kruse-Sonne bacillus and refer to the countries in which it has been reported as the cause of a form of dysentery. Their own work has consisted in a comparison of 3 strains obtained from muco-purulent dysentery stools of children in Nictheroy and Rio de Janeiro with 3 well-accredited European strains.

W. F. Harvey.

DE ASSUMPÇÃO (Lucas). Notas sobre a fermentação tardia e phenomeno de "caméléonage" com bacillos dysentericos. [**Slow Fermentations and "Cameleonage" of Dysentery Bacilli.**]—*Brasil-Medico*. 1929. Oct. 5. Vol. 43. No. 40. p. 1195. English summary pp. 1195-1196.

Late fermentation of sugars, that is, in 3 to 9 days, was observed very frequently with strains of Shiga and Y bacilli but only rarely with Flexner strains. Such late fermentation was principally of saccharose, to some extent of maltose and much less frequently of mannite and maltose. "Cameleonage" was observed in the case of late fermenters especially with saccharose but sometimes with maltose. By the term "cameleonage" is understood a reversion of the fermentation colour of a culture (semi-solid) to the original alkaline or neutral colour, when removed from the incubator to be kept at room temperature, and a restoration of its acid or fermentation colour when returned to the incubator.

W. F. Harvey.

WILLETT (Joseph C.). **The Application of the Twort-d'Herelle Phenomenon in the Diagnosis of Shiga Dysentery.**—*Jl. Lab. & Clin. Med.* 1929. Oct. Vol. 15. No. 1. pp. 83-84. [4 refs.] [Health Division Labs., St. Louis, Mo.]

The principle investigated was the use of a specific bacteriophage test for the identification of atypical dysentery cultures. Four such cultures had been met with in field work. Broth cultures were inoculated with anti-Shiga phage and showed complete lysis after 24 hours' incubation, as also did a stock strain of Shiga. Controls were set up at the same time in the shape of cultures of *Bact. typhosum* and cultures which contained no bacteriophage. The confirmation that the organisms thus identified were Shiga-dysentery was given later, when the originally atypical test strains became typical with further culture. None of the cases from which the organisms were derived showed clinical evidence of dysentery.

W. F. Harvey.

DE ASSIS (A.). Ueber die Shiga-Toxoide und ihre Verwendung in der Herstellung antitoxischer Dysenteriesera. [**Shiga Toxoids and their Use in the Procurement of Antitoxic Dysentery Sera.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 64. No. 1/2. pp. 49-60. With 1 text fig. [14 refs.] [Vital Brazil Inst. Nictheroy, Brazil.]

The experiments carried out were to some extent in continuation and confirmation of previous experiments. These had shown that a 0.25 per cent. formol produced a definite reduction in the potency of a bouillon Shiga toxin after 3 days at 37° C. It has now been shown that even in a concentration of 1 per cent., acting for 30 days at 37° C., the potency of the toxin is not yet completely annulled. Formol has precisely the same detoxicating action upon a suspension of bacilli in normal salt solution as it has upon the bouillon toxin. In these experiments an observation period of at least 15 days in rabbits must be allowed for the estimation of toxicity. Bacillary toxoid, as the formalized bacillary suspension is called, was used as antigen in horses by subcutaneous injection and furnished a satisfactory antiserum. Still better results were obtainable by addition of a tapioca suspension to the bacillary toxoid. These showed themselves by a more rapid production of a more potent antiserum. The local reaction was always considerable.

W. F. Harvey.

OKELL (C. C.) & BLAKE (Adelaide V.). **Dysentery Toxin (Shiga) : Notes on its Preparation with a Discussion of its Position as an Endotoxin.**—*Jl. Path. & Bact.* 1930. Jan. Vol. 33. No. 1. pp. 57-63. [14 refs.] [Wellcome Physiol. Research Labs., Beckenham, Kent.]

Three varieties of toxin: (1) dried Shiga bacilli; (2) filtrate; and (3) precipitated filtrate toxin have given consistent results. The medium for the preparation of filtrate toxin is made by adding 10 gm. Chapoteaut peptone and 5 gm. sod. chloride to 1 litre of bullock's heart extract, adjusting pH to 7·8 and sterilizing. One litre amounts of this medium are filled into 4 litre bottles and sown with 5 to 10 cc. of an overnight culture of Shiga's bacillus. Toxin is obtainable in about 14 days, when the reaction has reached pH 8·6 to 8·8, by filtration through a Berkefeld candle (N). Phenol (0·5 per cent.) may be added if the toxin is only to be used for horse immunization. The product is of high toxicity and should kill 100 per cent. of the test mice by intravenous injection in doses of 0·005 to 0·01 cc. Toxoid is prepared from the filtrate toxin by the addition of 0·6 per cent. formaldehyde. After 3 weeks at 37° C. the original toxin, which had killed mice in doses of 0·005 cc., is usually innocuous in doses of 1 cc. A horse immunized with such toxoid yielded a serum of over 2,000 international units after only 6 weeks' treatment.

That the toxin is a true endotoxin appears evident from the fact that the bacillary bodies are found to be fully toxic for mice after 16 hours' incubation, at which time growth is at its height, and yet there is no detectable toxin in the filtrate. If dysentery toxin is, on the evidence, to be classed as an endotoxin, it still resembles the exotoxins, such as diphtheria, in the specificity of its toxophore and haptophore groups and in its ability to give rise to potent and specific antitoxin when injected into animals.

W. F. Harvey.

YASUI (Kehnosuke). Ueber das heterogenetische Antigen in Shiga-Bazillen. [**Heterogenetic Antigen in Shiga Bacilli.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 63. No. 5/6. pp. 440-451. [15 refs.] [Cancer Research Inst., Heidelberg.]

A number of authors have demonstrated the presence of Forssman heterogenetic antibodies in the serum of rabbits immunized with Shiga bacilli. But, it is contended, this does not prove that Forssman antigen is contained in the bacilli, for they may only have supplied a non-specific stimulus to an increase of Forssman antibody already contained in rabbit serum. It has not been possible to obtain Forssman antigen by alcoholic extraction of lipoids from dysentery bacilli.

The author has used two strains of Shiga dysentery bacilli, No. 1 and No. 2. Eight out of 11 rabbits which survived immunization with killed bacilli of No. 1 strain furnished a serum which was haemolytic for sheep erythrocytes in greater or less degree, while the sera of the 3 rabbits immunized with No. 2 strain showed complete absence of haemolytic action. One may assume, therefore, that No. 1 strain supplied a specific stimulus to the increase of the haemolytic titre. That this is really a stimulus to the production of heterogenetic Forssman antibodies is likewise brought out by positive complement fixation and flocculation serum reactions of the dysentery antiserum with alcoholic extracts of the organs of those animals which contain heterogenetic Forssman antigen. On the other hand, complement fixation, absorption and flocculation experiments to demonstrate the presence of Forssman antigen in the Shiga bacilli by

direct test—that is, by test for the antigen itself with Forssman antisera—have failed. This failure is difficult to explain. Still it would seem to be demonstrated by the very different action of these No. 1 and No. 2 strains that some Shiga dysentery bacilli do contain heterogenetic Forssman antigen and that it is specific.

W. F. Harvey.

VAZ (Eduardo). Prophylaxia especifica da dysenteria bacillar. [**Specific Prophylaxis of Bacillary Dysentery.**—*Sciencia Med.* 1929. Nov. Vol. 7. No. 11. pp. 533–540.]

The author is a warm supporter of the oral administration of dysentery vaccine both for prophylactic and curative purposes (see this *Bulletin*, Vol. 25, pp. 627 & 629). The importance of effectively immunizing a population which is backward in its attention to common sanitary precautions is undeniable. Again the author insists emphatically upon a periodic survey according to regions and districts of the prevalence of diseases due to particular organisms. A regional index of incidence should be set up and the prophylactic vaccine used in any particular locality would have its proportional bacillary composition determined by that index.

The vaccine itself is prepared by culture of the several organisms in separate flasks of bouillon for 3 weeks at 37° C. with formolization at 0.25 per cent. Mixtures of organisms are made up to provide vaccine with a composition proportional to the regional index of the different bacilli. The vaccines are used regionally at the beginning of each summer, when diarrhoea becomes prevalent, in prophylactic doses of 30 to 60 cc. on 3–4 successive days.

W. F. Harvey.

DE ARAUJO (Eduardo) & TORRES (Octavio). Resultados da vacinação antidysenterica “per os.” Observações feitas na Bahia. [**Results of Antidysenteric Vaccination by the Mouth.**—*Sciencia Med.* 1929. Dec. Vol. 7. No. 12. pp. 604–608.]

The vaccine consisted of broth cultures of strains of dysentery and paradysentery which had been incubated for 21 days and to which 2.5 cc. formol were added per litre for sterilization purposes. Of 274 persons receiving the vaccine and kept under observation for 10 months, not one contracted dysentery, whereas five cases of bacillary dysentery and one of amoebic occurred among 38 controls.

W. F. Harvey.

DE ARAUJO (Eduardo). Da immunisação activa por via oral e sua utilidade pratica, especialmente contra a dysenteria bacillar. [**On Active Oral Immunization and its Practical Utility, especially against Bacillary Dysentery.**—*Sciencia Med.* 1929. Dec. Vol. 7. No. 12. pp. 633–648. [53 refs.]]

This article gives very extensive data of the use of vaccines by oral administration, and of the advantages which this method possesses over subcutaneous inoculation. The author considers that such vaccines and the keratinized bile pills which are required for use along with them should be produced in state laboratories; they are easy to prepare, and should be distributed free.

W. F. Harvey.

WALKER (W.) & WATTS (R. C.). **Dysentery Prophylaxis by Oral Bilivaccin at Poona and Secunderabad.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 183–190. [2 refs.]

This paper gives full details of the authors' careful observations. MANIFOLD's investigation, they note, revealed that in Poona the great majority of dysentery cases were bacillary and that Bact. Flexner was the most frequent infecting organism. They have tested the efficacy of bilivaccin as prophylactic against bacillary dysentery in British troops in Poona and Secunderabad. The total number so "protected" was 1,400 out of a total of 5,080, i.e., 27·6 per cent. They found that oral bilivaccin failed as a prophylactic against bacillary dysentery; and the clinical course of the disease did not appear to be modified in individuals who had been given the vaccine. The bilivaccin was that prepared by the Biotherapie Co., Paris, according to the researches of Professor BESREDKA.

H. M. H.

SMITH (F. Lewis). **The Means of Spread and Method of Control of Bacillary Dysentery.**—*Jl. Roy. Nav. Med. Serv.* 1929. Oct. Vol. 15. No. 4. pp. 253–277. [54 refs.]

An interesting review of the subject.

H. M. H.

MIXED AND UNCLASSED DYSENTERY.

LARGE (D. T. M.). **Dysentery in the Lahore Military District.**—*Jl. Roy. Army Med. Corps.* 1929. Nov. Vol. 53. No. 5. pp. 334–343. With 2 charts in text. [9 refs.]

A careful and valuable investigation revealing that :—

"(1) Bacillary dysentery in Lahore military district is very much commoner than amoebic, forming some 80 per cent. of the total dysentery.

"(2) Dysentery in Lahore district, while present throughout the year, increases markedly in incidence in the warm months prior to the real hot weather and immediately following it.

"(3) Bacillary dysentery has been almost invariably very mild in type in the years 1925 to 1927, even in the case of Shiga infections. Some cases of Flexner infection had only one day's diarrhoea with blood and mucus in the stools.

"(4) Bacillary dysentery in Lahore district is grouped into that due to *B. dysenteriae* Flexner 74·1 per cent. ; *B. dysenteriae* Sonne 13·3 per cent. and *B. dysenteriae* Shiga or Schmitz 12·6 per cent. . . .

"(6) Agglutination tests in the case of dysentery require incubation for sixteen hours at 56° C. It was found convenient to leave them overnight in the water-bath.

"(7) The diagnosis of Sonne dysentery requires a high titre serum made from a circular smooth colony of this organism, or preferably two sera, one from the circular smooth early form and another from the crenated late form.

"(8) An originally large group of inagglutinable Flexner organisms was found on retention for a year in the laboratory to have become agglutinable to a small extent with Flexner sera and then to have become capable of producing a serum which agglutinated various bacilli of the Flexner group, in some cases to high titre."

H. M. H.

KRISHNAMURTY (Ch.). Dysentery in the Central Jail, Rajamandry, Madras Presidency.—*Indian Med. Gaz.* 1929. Dec. Vol. 64. No. 12. pp. 679–681. With 6 charts.

In this jail careful investigation of stools gave :—

Year.	Amoebic. per cent.	Bacillary. per cent.	Mixed.	Case mortality. per cent.
1927	5.5	94.5	—	8
1928	10.0	88.4	1.6	2

The disease was spread chiefly by flies. Its incidence was directly proportional to the fly prevalence. Most cases occurred in January, after which it abated gradually, until it was almost absent in April; it commenced again in July, and waned in November. Shiga and Flexner type dysentery bacteria were present throughout the year; they were least virulent in summer.

H. M. H.

UKIL (A. C.). The Dysenteries in Bengal.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 239–245. With 1 chart. [9 refs.] Also in *Calcutta Med. Jl.* 1928. June. Vol. 22. No. 12. pp. 627–636. With 1 chart. [9 refs.]

The author states that one-fifth of the total number of deaths in Calcutta are due to dysenteries, whereas cholera carries away half that number. Nearly a century ago Norman CHEVERS recorded that three-quarters of the total deaths amongst the lower orders of Indians were due to diarrhoea.

H. M. H.

MAITRA (Jitendra Nath). Combined Amoebic and Bacillary Dysentery in Calcutta (Preliminary Paper).—*Calcutta Med. Jl.* 1929. Sept. Vol. 24. No. 3. pp. 109–110.

In this—preliminary—paper the author records that in course of necropsy work he has often observed that the mucous membrane of the colon in between typical amoebic ulcers might have the appearance of a superficial necrosis characteristic of bacillary dysentery. Microscopical examination of sections has not been satisfactory—owing mainly to the fact that autopsy was performed more than 24 hours after death. He has therefore carried out a series of fresh stool examinations, by direct microscopy of wet fixed and stained specimens and by culture, and also by agglutination test of the bacteria obtained by culture. He has thus obtained Shiga or Flexner type bacteria from the stools, in which he has also found “moving amoebae histolytica and cysts, cysts alone and with flagellates.”

H. M. H.

LEE (Shih-wei). Dysentery complicating Pregnancy and the Puerperium.—*China Med. Jl.* 1929. July. Vol. 43. No. 7. pp. 666–678.

This paper embodies the author's observations in 38 obstetrical cases in Peking. Twenty-eight were bacillary dysentery, five amoebic, three double infection, and two were cases of amoebiasis. Of these

- eight developed their dysentery after delivery. The author's conclusions are that the commonest time for pregnant women to contract dysentery is during the eighth and ninth months of pregnancy. Premature labour is the outstanding liability in pregnant women contracting dysentery, and is likely to occur if the dysentery is not properly treated during the first week of the disease.

H. M. H.

TAKEDA (S.). Dosage du sucre du sang dans la dysenterie des enfants. [**Estimation of Blood Sugar in Dysentery of Children.**]—*Oriental J. Dis. Infants*. 1929. Mar. Vol. 5. No. 2. [In Japanese. French summary pp. 17–18.] [*Pediat. Inst., Imperial Univ., Kyoto.*]

The investigation was carried out on 119 children fasting, and on several occasions during the dysentery attack. It was found that there was a light hypoglycaemia on the first day of the illness. On the second and third days the blood sugar was normal. Up to the 19th day large oscillations above and below the normal occurred—indicating that the dysentery destroyed the power to control the quantity of sugar in the blood. The hypoglycaemia at the onset of illness cannot be attributed to effect of vomiting, nervous symptoms, hunger, etc.; it may be result of impairment of glycogenic function of liver by the dysentery toxin.

H. M. H.

GOLDIE (H.). Remarques sur la cytologie des selles. [**Notes on the Cytology of the Stools.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 424–431. [14 refs.]

A good résumé of the views of various authors on the differential cytological characters of the stools in bacillary and amoebic dysentery is given, which may be summed up as: (1) Polynuclear and macrophage preponderance, degeneration (toxic) of cells as a whole giving rise to "ghost cells" in bacillary dysentery, (2) lymphocyte preponderance, degeneration (proteolytic) of cells at their circumference, great segmentation of nuclei of polynuclears, agglutination of red blood cells and presence of Charcot-Leyden crystals in amoebic dysentery. The next point considered is the information afforded by a special staining mixture in which neutral red and flavine serve to stain the living cells and basic fuchsin the dead cells. The formula is: 10 per cent. neutral red 1 to 2 drops; 2 per cent. flavine 5 drops; 2 per cent. basic fuchsin 2 to 3 drops; distilled water 5 cc., and this should be made up at the time of use from the several watery solutions. Living cells absorb first the flavine then the neutral red. Degenerated or necrotic elements take the fuchsin. Neutrophils and lymphocytes stain clear yellow. In the macrophages the protoplasm is rose pink, the nucleus yellow, the granules red-yellow and the vacuoles, if present, yellow. Living epithelial cells show up in various shades of yellow and necrotic endothelial elements red. With the death of the cells the number which take the red stain increases: nuclei change from clear yellow to brown and finally red. Amoebae, even non-dysenteric amoebae are stained a very pale yellow and show red granules. Cysts do not stain. Flagellates stain just as do amoebae but retain their vitality for a long time. Blastocystis is stained intensely in different shades of yellow. Spores of fungi are coloured yellow and their mycelium red.

W. F. Harvey.

PACHECO (Genesio) & FIALHO (Amadeu). Exame do exsudato intestinal na dysenteria bacillar. [**The Examination of the Exudates in the Stools of Bacillary Dysentery.**—*Sciencia Med.* 1929. Sept. Vol. 7. No. 9. pp. 452-455. [3 refs.] English summary p. 456.]

The character and number of cells which are present in films made from stools are a valuable aid to diagnosis. The differential cell picture obtained is called—after ALEXEIEFF (this *Bulletin*, Vol. 25, p. 240)—a “pyogram.” In amoebic dysentery the cellular elements are few and mononucleated, in bacillary dysentery numerous and polymorphonuclear. The exudate was examined in 28 cases of suspected dysentery, 15 of which proved by culture to be positive bacillary dysenteries. The pyogram in bacillary dysentery cases, according to ALEXEIEFF, is given as 97 to 98 per cent. neutrophiles, 1 to 2 per cent. eosinophiles and a few plasmophages [macrophages]. The authors, however, found in their cases that plasmophages were sometimes present in large numbers and always in greater number than the eosinophiles. In the non-dysenteric group the eosinophiles were more numerous than the plasmophages and so were the monocytes when present.

W. F. Harvey.

KHALED (Zaki). **The Use of the Sigmoidoscope in the Laboratory Diagnosis of Dysentery and Colitis.**—*Jl. Egyptian Med. Assoc.* 1929. Nov. Vol. 12. No. 9. pp. 163-168. With 1 text fig.

The sigmoidoscope, states the author, is so simple to handle, so harmless to use (within certain limits), and at the same time such a valuable help in the examination of chronic intestinal troubles that it should find a place in every clinical laboratory. He has found that sigmoidoscopy before examination of stools eliminates all affections simulating true dysentery—e.g., cancer, polypus, bilharzia, tuberculosis. If the stools are positive for amoebic or bacillary dysentery, it reveals the intensity of the lesions, allows of tracing their evolution and making a prognosis, and of observing result of treatment. If the stools are negative, material can be obtained direct from the bowel wall, and may alter the negative to a positive finding, and if this be still negative the pathogenic change in bowel wall can be identified. A double examination should always be made of the enema or laxative stool, and of a swab obtained direct from the bowel wall. [A scraping is still better.]

H. M. H.

MÜHLENS (P.). **Eight Years' Experience of Yatren in the Treatment of Amoebic and Bacillary Dysenteries and their Sequelae.**—9 pp. Lecture delivered before the International Congress for Tropical Medicine and Hygiene at Cairo, 15-22 December, 1928.

—. Huit années de traitement de l'amibiase et de la dysenterie bacillaire.—*Rev. Prat. Malad. des Pays Chauds.* 1929. May. Year 8. Vol. 9. No. 5. pp. 224, 227-230, 233-236, 239-242, 245.

A review [in much greater detail in the French paper] of the author's own experience, and also of that of many other workers in various

countries whom he cites in his support. [Abstracts of all these papers have appeared in this *Bulletin*.] This eight years' experience leads him to conclude that "Yatren 105" properly employed is the best remedy at present for dealing with cases of chronic amoebic dysentery and its sequelae (ulcerative and membranous colitis, spastic constipation, etc.); it gives 70-100 per cent. real cures and that from a single course.

Many cases need the drug solely by mouth; others by rectal injection only; others again need both methods. In acute amoebic dysentery yatren acts specifically. The irritative diarrhoea is slight and tolerable if proper modifications in treatment are followed. Particularly gratifying were results of treatment of acute and chronic amoebic dysentery in chronic carriers exhibiting no symptoms, and in children. Clinical signs, *Entamoeba histolytica* and its cysts, all usually disappear within a few days of instituting yatren treatment. *E. coli*, *Endolimax nana*, *Iodamoeba*, *Balantidium coli*, and the *minuta* forms of *E. histolytica* soon cease, in most cases, to be discoverable after the giving of yatren.

Less certain and less lasting are its effects in *Lamblia* and *Trichomonas* infestations; they are better, however, in *Blastocystis*, *Councilmania* and *Chilomastix*.

In bacillary dysentery, in particular Shiga-Kruse infections and their sequelae, remarkable successes have been recorded.

From various quarters have come recommendations for the use of yatren *prophylactically* (2-4 [0.25 gm. each] pills a day twice a week) in districts where dysentery is endemic.

The non-toxicity of yatren in doses up to 10-12 gm. a day is generally recognized. Nevertheless, 1.5-3 gm. per os, or in enemata to be retained in bowel, nearly always suffices to attain sure therapeutic effect.

H. M. H.

SCHREIBER (Georges). Médecine préventive de la dysentérie. [**Prophylaxis of Dysentery**.]—*Rev. Prat. Malad. des Pays Chauds*. 1929. Oct. Year 8. Vol. 9. No. 10. pp. 478-482, 485-489. [17 refs.]

The author records briefly the reported successes [but none of the failures] of various therapy as preventives.

H. M. H.

AMENTA (S.). Un caso di epatite amebica a tipo subacuto non colliquato.—*Arch. Ital. Sci. Med. Colon*. 1929. June 1. Vol. 10. No. 6. pp. 256-261. English summary (5 lines) p. 261.

BHANDARKAR (P. R.). Acute Amoebic Dysentery treated by *Hedyotes auriculares*, N.O. Rubiaceae.—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. p. 387.

DIMITRIJEVIĆ-SPETH (V.) & MAGOVCEVIĆ-SCHNEIDER (Dobrila). Ueber ein bewegliches Stadium der Dysenteriebakterien.—*Zent. f. Bakt.* 1. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 509-511. [Central Hyg. Inst., Belgrade.]

FRANCHINI (Giuseppe). Amebiasi bronchiale.—*Arch. Ital. Sci. Med. Colon*. 1929. July 1. Vol. 10. No. 7. pp. 289-292. With 1 text fig. English summary p. 292. [Inst. of Trop. Path., Univ., Bologna.]

GARCÍA ESPÍN (José). Observaciones y estudios sobre disenterias y amebiasis.—*Semana Méd.* 1929. Sept. 12. Vol. 36. No. 37 (1861). pp. 801-805. [General Hosp., Granada.]

MACDONALD (Ian). Hepatic Amoebiasis simulating Cholecystitis. Drainage of Abscess by Cholecystostomy: Recovery.—*Lancet*. 1929. July 27. pp. 171-172. [1 ref.]

- MARSH (Frank). Bacillary Dysentery.—*Jl. Trop. Med. & Hyg.* 1929. Aug. 1. Vol. 32. No. 15. pp. 205-207.
- DE MELLO (I. Froilano) & DA CRUZ (L. J. C.) Résultats du traitement expérimental de divers états d'amébiase intestinale par le Yatren purissimum. Mémoire présenté au Congrès International de Médecine Tropicale et d'Hygiène du Caire. 1928. 26 pp. [39 refs.] [School of Med., Nova Goa.]
- NAKAMURA (H.) & SHAN (Chü Ping). On the Culture Media for the Isolation of Dysentery Bacteria.—*Jl. Oriental Med.* 1929. Oct. Vol. 11, No. 4. [In Japanese. English summary p. 132.]
- VAN NITSEN (R.) & LANGERON (J.). A propos d'un cas de dysenterie amibienne.—*Bull. Méd. du Katanga.* 1929. Vol. 6. No. 1. pp. 41-43.
- ORIISHI (Naotsugu). Paratyphoid Group Bacillus isolated from Stool of Dysentery like Disease of Infant.—*Jika Zasshi (Jl. Pediatrics).* 1929. May. No. 348. [Summarized in *Japan Med. World.* 1929. July 15. Vol. 9. No. 7. p. 231.]
- PACHECO (Genesio). Observações sobre um surto de dysentaria bacillar nos quarteis da Villa Militar de Deodoro—Rio de Janeiro—durante o verao de 1926-1927.—*Sciencia Med.* 1929. June. Vol. 7. No. 6. pp. 261-266. [7 refs.] [German summary p. 266.]
- PALEVICI-SADOGURSKAJA (Malca). Ricerche ed osservazioni sui batteri della dissenteria.—*Giorn. di Batteriol. e Immunol.* 1929. Sept. Vol. 4. No. 9. pp. 837-857. [3 refs.] [Inst. of Bact. & Immunol., Univ., Turin.]
- PONS (R.). L'orientation actuelle des idées dans l'amébiase.—*Rev. Prat. Malad. des Pays Chauds.* 1929. July. Year 8. Vol. 9. No. 7. pp. 310-314, 317-320, 323-325.
- SALVIOLI (Gactano). Osservazioni epidemiologiche e terapeutiche su di un caso di amebiasi osservato a Padova.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Sept. Vol. 33. No. 9. pp. 472-474. [4 refs.] [Lab. of Trop. Path., Univ., Padua.]
- SORGE (Giuseppc). Sulle epatiti amebiche.—*Policlínico. Sez. Med.* 1930. Vol. 37. 16 pp. [1 ref.] [Med. Clinic, Univ., Catania.]
- WHITAKER (E. J.). Charcoal in the Treatment of Bacillary Dysentery.—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 143-144. [Tela Railroad Co. Hosp., Tela, Honduras.]

ERRATUM.

T.D.B., Vol. 26, No. 11, p. 896, WELCH summary, lines 4 & 5. Read on second and third days 1 drachm (castor oil) hourly, "not 1 oz.

HELMINTHIASIS.

FÜLLEBORN (F.). **Epidemiological Observations on Hookworm Infection. Discussion of the Question of Immunity and Specific Reactions of the Host in Helminthic Infection.**—*Brit. Med. Jl.* 1929. Apr. 27. pp. 755-759. With 6 text figs.

In North Corrientes, adjoining Paraguay, Stoll's caustic soda method showed a percentage of infection with hookworms of practically 100 and an average infection of 430 worms, 95 per cent. being *N. americanus* and 5 per cent. *A. duodenale*. Children under 10 were about twice as heavily infected as adults over 20. "The people of Corrientes in general give one the impression of being healthy, intelligent and lively," with a haemoglobin index on the old Sahli scale of 81.7 for males. Fülleborn has become "more and more convinced that in the past the damage caused by a slight hookworm infection in native populations has often been overestimated." In general, the haemoglobin content fell as the number of ova increased group by group, when the worms averaged more than 400 to 800. KIKUTHI, collaborating with Fülleborn, found several times, but not always, a haemolysin in high concentration in the Ringer's solution in which living *A. caninum* had been kept for some days at body temperature. It was not destroyed by boiling. Precipitin and complement fixation tests and skin reaction to helminthic infections are discussed, and creeping eruption shortly considered.

Clayton Lane.

DIKMANS (G.). **The Viability of Hookworm Eggs and Larvae in Pit Latrines.**—*Amer. Jl. Trop. Med.* 1929. May. Vol. 9. No. 3. pp. 195-205. With 1 text fig. [6 refs.] [Experm. Station, U.S. Dept. Agric., Mayaguez, Porto Rico.]

Experiments were undertaken which confirm the observation that hookworm eggs submerged in liquid (in this instance urine or latrine liquid was used) do not develop, but that they will do so to infectivity if the eggs are removed and placed in suitable conditions. In these experiments viability persisted in submerged eggs for 11 days, the limit of the tests. When the infected faeces were not broken up (as they were in the experiments just cited) and were not always submerged, development might occur, and larvae were found in these conditions in latrine liquid up to 22 days, and eggs were viable up to 28 days, at which time the experiment ended.

A pit latrine was dug 4 feet square and 6 feet deep, with a trench behind, which allowed soil to be sampled at various depths and at various distances from the latrine. In this pit were placed daily urine and faecal material known to contain hookworm eggs. It took a surprisingly long time for "latrine conditions" to be established, namely, for the "bottom of the pit to become covered with black malodorous material to a depth of 1 or 2 inches." Whether further addition of faeces then took place does not seem to be stated, but no larvae were later found in the latrine material, in the surface soil round it or in the borings. Larvae were found in the well of the pit as high as 12 inches above the surface of the sludge. "As Payne has shown, infective hookworm larvae do not crawl up the side of a pit for any great distance," so that

if the latrine were nine feet deep as local regulations require, the 12 inches noted "would not constitute a great danger." "These findings apply only to the pit latrine with which the work has been done, i.e., a pit latrine dug in a heavy clay soil well above the ground water level." [Florence PAYNE actually showed that *within* a sandy loam soil larvae migrated upwards 36 inches, the limit set by the experiment, and that this occurred whether they were buried as larvae or as eggs. Within pure clay they did not migrate 6 inches. See this *Bulletin*, Vol. 20, p. 949.]

C. L.

MINAMIZAKI (Yushichi). **A Study on Hookworm Infestation in the Field.**—*Jl. Public Health Assoc. Japan*. 1929. July. Vol. 5. No. 7. pp. 1-3.

Minamizaki concludes that when a urine-faeces mixture containing hookworm eggs is sprinkled over soil, larvae develop in Saitama, Japan, except in winter and live 6 months. When the mixture is added to water, eggs live 9 weeks in summer and 5 to 6 in winter. He infected himself twice by walking bare foot on soil manured by night soil and positive by Baermann's apparatus to hookworm larvae. He experienced ground itch lasting for a number of days, and cough with plentiful expectoration, severe enough to prevent sleep on the second occasion, beginning on the 5th or 6th day and lasting 2 to 3 weeks. Eggs appeared on the 58th day after the first infection to the extent of some 50,000 daily, and on the 50th day after the second infection increased to 200,000 daily. Numbering was by Stoll caustic soda method.

C. L.

PESSOA (Samuel B.). Os levementes infestados nas campanhas sanitarias contra a ancylostomose. [**Light Infestations in Ankylostomiasis Campaigns.**]—*Bol. Inst. Hyg. de São Paulo*. 1929. No. 38. 8 pp. [12 refs.] [Hyg. Inst., S. Paulo.]

Pessoa records observations on 5 children. In the present state of our knowledge, he concludes, it has not been proved that lightly infested persons are without hygienic importance; the symptoms and blood formula in children often have no relationship to the number of worms carried; they should be treated to a microscopic cure.

C. L.

FISCHER (W. O.) & ORENSTEIN (A. J.). Die Hakenwurmkrankheit unter den Minenarbeitern am Witwatersrand. [**Hookworm Infestation among Miners on the Rand.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26 (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 111-114. [Dept. of Sanitation, Rand Mines, Johannesburg.]

The authors examined by Willis's salt floatation method admissions into the City Deep Central Native Hospital and found hookworm eggs in 50 per cent. of "East Coast Boys" and 11 per cent. of "Union Boys." The floatation vessel was 7 cm. high and 4 cm. broad, and the Union Boys had already received carbon tetrachloride. The total number reported upon is uncertain but was not less than 1,530. About half the East Coast Boys had been in the mine not longer than 2 months, and

it is concluded that they must have been infected on arrival. Of 57 whites examined because suspected of infection this method of diagnosis gave an infection rate of 75·4 per cent., but in natives symptoms were usually slight. The soil of thirteen mines was examined and was found infected in all, and on one occasion larvae were recovered from the boots of the doctor and his sanitary gang immediately after a round of duty, an illustration of one method by which infection may be spread. In two mines mules were used, all animals, even dogs, being excluded elsewhere. *Strongyloides* larvae were found at the rate of 2 per mille in fresh stools. The infected parts of mines had a temperature between 19° C. and 27° C. (66°–80° F.); the reaction of their water varied from alkaline to an acidity corresponding to 0·075 per cent. of sulphuric acid. It is advised that new-coming East Coast Boys should be twice treated, with 3 to 4 cc. of carbon tetrachloride; [the present dosage which seemingly leaves 11 per cent. infected to a diagnosis by Willis's method is unstated]. The existing variety in latrines and transport of faeces to the surface should be made uniform according to some model method. Disinfection was being investigated.

C. L.

AUGUSTINE (D. L.), HELMY (M.) & NAZMI (M.). **Ancylostomiasis and Ascariasis in Egypt.**—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 136–148. With 13 text figs. [3 refs.] [Med. School & School of Public Health, Harvard Univ., Boston]

From 12 villages about 900 satisfactory faecal specimens were obtained. They were examined for infection by Willis's floatation method and counted by Stoll's [apparently by Stoll-Hausheer]. In Upper Egypt the intensity [here the meaning is the percentage of population infected] of ancylostome infection is high, in Lower Egypt low. The reverse holds of ascari infection. For the sexes the intensity [here the meaning is average number of worms per head] of infection is higher in men for ancylostomes and for women for ascaris. Regarding prevention, it is pointed out of the fellaheen that "not until some constructed latrine equally good or better than that provided him by nature is placed at his disposal will he be willing to forsake the former." The average number of hookworms, all *A. duodenale*, recovered from 37 worm counts was 51. Only four persons harboured over 100 hookworms. "Two of these cases yielded 168 worms respectively," the third exactly 200, and the fourth exactly 400, so the paper states.

C. L.

MIRRA (Guido). L'anchilostomiasi nella Somalia Italiana meridionale. Note su 4000 casi accertati lungo il medio Uebi-Scebeli. [**Ankylostomiasis in Southern Italian Somaliland. Notes on 4000 Cases met with along the Webi Shebeli.**—*Ann. di Med. Nav. e Colon.* 1929. Sept.–Oct. Year 35. Vol. 2. No. 3/4. pp. 181–192. With 1 plate. [6 refs.]

Hookworm infestation in some parts of Italian Somaliland is very prevalent. In one group of 600 individuals examined, 72 per cent. had ova of *A. duodenale* in the faeces, 28 per cent. *N. americanus*, 64·5 per cent. *Ascaris lumbricoides* and 22·3 per cent. *Trichuris trichiura*. Flagellates, *Chilomastix mesnili* and *Trichomonas*, were also found in 8 and 5 per cent. respectively. He compares the results of oil of

chenopodium, thymol, betanaphthol, and carbon tetrachloride in treatment and finds the last to give the best results in doses of 3 cc. for adults.

H. Harold Scott.

MAPLESTONE (P. A.). **The Species Distribution of Hookworms in India.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 371-373. [6 refs.] [School of Trop. Med., Calcutta.]

In-patients of the Carmichael Hospital, Calcutta, were examined for hookworm infection, evidently as a routine measure, since it is stated that few were admitted for hookworm treatment. There were found infected 646; what percentage this comprises is not clear. Hookworm eggs were still present in 231 cases after one or more treatments, the drug used not being indicated, while 91 were discharged for other reasons before it could be ascertained with certainty whether they had ceased to pass eggs. Lane's direct centrifugal floatation was used for determining this point in the second half of the series and showed a cure percentage of 47, as compared with one of 68 in the first half, obtained by an unstated technique, "there being no other change in treatment or diagnosis whatever." The number of worms recovered was 18,634, comprising 13,483 *N. americanus* (6,285 males and 7,198 females) and 5,151 *A. duodenale* (2,213 males and 2,918 females). *A. braziliense* was absent. Reference is made to reported species distribution in various parts of India [to which may be added that in the abstracter's experience *A. duodenale* was entirely absent in the Darjeeling hills, where hookworm disease due to necator was severe, but was present as well as necator in the plains at their feet].

C. L.

JACOBS (W. P.). **Report of the Director, Anchylostomiasis Campaign, Ceylon, for the Year 1927.**—*Ceylon Administration Rep. Director of Med. & San. Services 1927.* Appendix pp. C 50-C 61. With 2 maps & 8 figs. on 4 plates.

In this extensive campaign all stool examinations were made at a central laboratory. Precautions taken to prevent hatching of larvae between collection and examination are unnoted. These examinations, made during 1927 by Stoll's caustic soda dilution method, numbered 23,055, while those treated numbered 1,348,102. If specimens sent to the central laboratory were negative to Stoll's method they were examined by "the salt floatation method" [of which there are several having very varying degrees of accuracy]. For treatment oil of chenopodium was given to children between 2 and 10 years of age; above that age this drug was combined with carbon tetrachloride. The proportion was 2 to 1 up to 18 and 3 to 1 over that age, the maximum dose of the mixture being 45 minims. This treatment left behind between a quarter and a third of the worms as judged by the Stoll counts made before and 15 days after treatment, and reduced the recognized percentage of infected persons from 87.7 to 53.7 [the first figure, it may confidently be concluded, being less incorrect than the second (see MAPLESTONE and MUKERJI below p. 419)].

C. L.

LALLEMANT (M. Avé). Die Hakenwurmbekämpfung in West-Flores (1923-1927). [**Anti-Hookworm Measures in West Flores, D.E.I.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Apr. Vol. 32. No. 4. pp. 175-178. With 2 text figs.

This inhabitants of this island in the Dutch East Indies are mainly of Malayan blood with a small admixture of Papuan. All are infected with hookworms and nearly all with ascaris. The mean haemoglobin index of 12 villages at a height of 1,200 m. (4,000 ft.) is 58 to 67, the altitude being held to exclude malaria as a cause. The people live in circular or oblong houses raised on piles 1 m. from the ground, each containing compartments for 5 to 40 families, and defaecation at night takes place through holes in the floor. This soiled ground beneath the houses is the favourite playground for children when it rains, and the men keep gear there and go in to attend to it. From 200 cc. of the soil under the houses 5,000 nematode larvae have been recovered, from that of the coffee gardens a maximum of 38. Among the inhabitants there is a slight preponderance of necator over ancylostomes, 561 to 439 per 1,000 worms. Of the children two-fifths die from intercurrent illness attacking those weakened by hookworm infection. The villages are being rebuilt as small houses raised 1.75 m., so that sun and wind can dry up the ground under them, a condition which Lallemand finds to destroy larvae in the local earth. Treatment has been given to 237,000 persons, at first 3 cc. of carbon tetrachloride and 18 drops of oil of chenopodium. On account of vomiting, headache, and fatalities the doses are now $2\frac{1}{2}$ cc. and 15 drops respectively. There were six deaths in all, whether all with the use of the higher dosage is unstated.

C. L.

PIROT. Nécatorose chez les matelots indigènes du recrutement Indochinois, embarqués sur un bâtiment des forces navales en Extrême-Orient. [**Necator Infection in Sailors, Natives of Indo-China, on Board Ship.**]—*Arch. Méd. et Pharm. Nav.* 1929. Apr.-May-June. Vol. 119. No. 2. pp. 284-292. [7 refs.]

Adult worms were not seen; the diagnosis rests on the statement that *A. duodenale* has never been found in Indochina. By smears and Telemann's method eggs were found in 27 of 37 sailors examined at the beginning of the cruise, and in 10 per cent. fewer after 18 months' duty. Three culture experiments were found very puzzling, larvae disappearing. The cultures were set in a dish containing caustic potash ["lessive de potasse"] of unstated strength [which perhaps dissolved all migrating larvae].

C. L.

SCHAPIRO (Louis). Infestación de Ancylostoma en Costa Rica después de 15 años de combatirla. [**Hookworm Infestation in Costa Rica after Fifteen Years' Campaign.**]—Reprinted from *An. Facul. de Med. de Costa Rica*. 1929. Oct. pp. 75-111. With 5 graphs. [7 refs.]

As regards the actual percentage of infection the improvement would not seem to be very great after so long a campaign. The figures are

given for the periods 1914-20 and 1921-27. During the first, 267,573 persons were examined and 52.8 per cent. were found infested; in the second, 228,941 were examined, 54.1 per cent. infested. The sexes were attacked in the proportion of 55 males to 45.7 females [but the number recorded as examined is nearly 20,000 greater than the total given previously for the same period]. 57 per cent. of those between 6 and 18 years of age, and 59.3 between 19 and 40 years were infested. As for race, of 176,919 whites 75,170 (42.4 per cent.) were affected; of 93,933 half-castes 68.3 per cent.; of 1,536 blacks only 231 (or 15 per cent.); but of 909 native Indians 841 (or 92.0 per cent.) were found.

In the towns the infection was but mild, as would be expected, whereas in the rural districts fully half the population had hookworms to a serious degree, and one-third of these were very heavily invaded. The degree, however, is less than in the early days of the campaign, for in 1911, as shown by hospital statistics, 26.2 per cent. were admitted for ankylostomiasis as compared with 9.5 per cent. during the five years 1922-26.

The most recent records show that 78.5 per cent. have but a mild infestation and only 2.9 are seriously infested; the average reduction of haemoglobin is to the region of 60 per cent., or a little over. Faecal examination was by three smears of 2 by 1 inches.

H. Harold Scott.

NAUCK (Ernst G.). Zur Hakenwurmverbreitung in Costa Rica. [**Distribution of Hookworm in Costa Rica.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Sept. Vol. 32. No. 9. pp. 482-484. With 1 map in text. [1 ref.] [San Juan de Dios Hosp., San José, Costa Rica.]

In the first hundred post-mortem examinations made in Costa Rica by Nauck there was a pure infection with *N. americanus* in 24, a pure infection with *A. duodenale* in 5 and a mixed infection of the two in 9. All the cases of infection with *A. duodenale* came from the Pacific zone of the isthmus.

C. L.

HILL (Rolla B.). La anquilostomiasis en Venezuela. [**Ankylostomiasis in Venezuela.**]—*Gac. Med. de Caracas.* 1929. Jan. 31. Vol. 36. No. 2. pp. 17-19. [Public Health Lab., & Rockefeller Foundation, Maracay, Venezuela.]

Diagnostic examination was by the Willis technique, while about 10 per cent. were counted by the Caldwell technique. Of the 10,653 persons examined this diagnostic method showed 70 per cent. infected with hookworms and 91 per cent. with intestinal parasites of some kind. Regional hookworm infection varied from 20 to 92 per cent., and in the latter case some 40 per cent. were gravely infected. Of 5,000 worms collected all were necators. Less than 10 per cent. of houses in the interior have latrines.

C. L.

HERNANDEZ PACHECO (Diego). El problema de la anquilostomiasis en las minas de España. [**Ankylostomiasis in Spanish Mines.**]—*Medicina Paises Cálidos*. Madrid. 1928. Jan. Vol. 1. No. 1. pp. 39–53. With 11 text figs. (1 map).

Examinations, apparently of a routine nature, were made on many miners between 1925 and 1927. The mode of examination seems nowhere stated. The percentage of infection found varied from 89 to 0 in different mines. Districts with coal mines showed the highest percentages, namely, 35, 43, 58 and 61; those with lead mines came next, namely, 14 and 30; while those with copper-iron mines were without infection. Treatment was with 1·4 to 1·8 cc. of oil of chenopodium in the early morning followed by 60 cc. of a saturated solution of sulphate of magnesia. The whole was repeated in ten days. By the unstated diagnostic method used this gave 82·14 per cent. of cures. The effects seem to have been irregular. For example, the percentage of infected in Santa Rosa and Antolin mines was unchanged between 1925 and 1927, whereas in S. Rafael it rose from 78 to 86 in 600 to 800 examinations in each year, while in the mines of Linares there was a general fall.

C. L.

GUILLAMON (Antonio). La anquilostomiasis en la huerta de Murcia. [**Ankylostomiasis in Murcia.**]—*Medicina Paises Cálidos*. Madrid. 1928. Jan. Vol. 1. No. 1. pp. 54–63. With 6 figs. on 2 plates & 1 text fig. [5 refs.]

This report deals with a population which, whether adult or not, worked bare foot in vegetable gardens. Willis's floatation technique was used for diagnosis and 1,322 persons were examined. The infection rate, as reported by various organizations, lay between 8·49 and 34·09 per cent.; the author's was 12·22 in 90 examinations of 44 boys and 46 girls, that for school boys being 18·18 and for school girls 6·52. Treatment was by oil of chenopodium, 1·2 cc. to 1·5 cc. for an adult. A great point was made of propaganda in schools. [Infection in about 700 miners of Murcia in 1925 was 1 per cent.]

C. L.

RICO (J. Toscano). **Indigenous Hookworm Disease in Portugal.**—*Arquivos Inst. Bact. Camara Pestana*. 1928. Vol. 6. No. 1. pp. 89–120. With 1 map. [22 refs.]

The 5 coal mines investigated vary. One was an open quarry and had no infection. Another had galleries of slight depth which had been worked for a few months only by persons dwelling in the neighbourhood and had an infection rate of 10·5 per cent. A third had galleries opening on the hillside worked by regular miners, as well as by the men of the neighbourhood as a secondary occupation, the latter working shod, and defaecation in the mine being forbidden; the infection rate was 13·8 per cent. The other two were typical shafted and galleried mines in which men eased themselves as they worked, and had infection rates of 47·4 and 98 per cent. Diagnosis was by what is called Willis's method, but is really a modification of the Hamburg cover-glass method which merely samples the surface and does not take up the whole of it as does Willis's. In all, 323 persons

were examined microscopically. Treatment of a "small number of men" was by oil of chenopodium, 3 cc.; stools of the following 24 hours were examined for parasites; but no general ratio between ancylostomes and necators could be offered, though in S. Pedro do Cora mine, with 47.4 per cent. of ascertained infection, ancylostomes predominated. "Against the numerous advantages which it [D.C.F.] offers the fact that it requires special apparatus and experienced investigators to work it justified (not to mention the long time it takes) the wide use by American authors of the simplest of all, the Willis method." [One suitable D.C.F. centrifuge with its normal team of cheap labour would have completed in one day the amount of diagnostic work here reported; and Willis technique was not that in use.]

C. L.

GARIN (Ch.), DOUBROW & MOUNIER. Deux ans de lutte contre l'ankylostomose des mineurs dans le bassin de St. Etienne (Houillères de Montrambert). [**Two Years Anti-Hookworm Measures in Coal Miners of St. Etienne.**—*Méd. du Travail*. Lyons. 1930. Jan. Vol. 1. No. 2. pp. 41-50. [6 refs.]]

The method of diagnosis was Garin's modification of Telemann's technique (this *Bulletin*, Vol. 25, p. 936) which takes 5 minutes for each examination. It displayed these percentages of infection: Loire mines, 49; St. Etienne pits, 42; la Molière and Firminy rock, 27; La Chazotte, 50; Forez, 50. Of the 1,200 parasitized, 1,032 were classed as carriers, 31 as sick and 173 as ailing. The division between carriers and others came where, by the above technique, there were much less than, or more than, 200 eggs in a faecal preparation 22 mm. square. The really sick had as many as 3,000 eggs in this quantity. Carriers had 70 per cent. or more haemoglobin to the Sahli-Gowers instrument. Treatment was by 3 gm. of powdered thymol on each of 3 consecutive days.

C. L.

BRUNI (R. M. Enrico). L'anchilostomiasi nell'Abruzzo Citeriore. (400 casi). [**Ankylostomiasis in Abruzzo Citeriore.**—*Ann di Med. Nav. e Colon.* 1929. July-Aug. Year 35. Vol. 2. No. 1-2. pp. 26-43. With 2 plates. [2 pages of refs.]]

This district lies on the Italian Adriatic coast. The cases of ankylostomiasis recovered numbered 400. Diagnosis was by Kofoid and Barber's gravity floatation, which also disclosed ascaris 116, trichuris 68, enterobius 28, and *H. nana* 5 infections. Treatment and prophylaxis are considered.

C. L.

BLAJIN (A. N.). Die neuen Quellen der Nekatorose im Uferland des Schwarzen Meeres. [**New Findings of Necator on the Black Sea Shore.**] Referat, gehalten in der Kommission für das Studium der Helminthenfauna von SSSR, am Zoologischen Museum der Unionakademie der Wissenschaft. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Jan. Vol. 32. No. 1. p. 50.]

Blajin has investigated the percentage of parasitism by hookworms in Abkhasia on the shores of the Black Sea. Stools were examined in over 700 cases, the method being unstated in the author's summary.

The percentage of children found infected in one school was 88·6, in another 42·5. The average seems to have been about 57. After thymol, given in doses of 4 to 6 gm. to children, 58 per cent. of cases passed necators, one having as many as 1,572 worms and haemoglobin of 25 per cent. As usual the infection is essentially one of villagers.

C. L.

MTSCHEDLIDSE (I.). Materialien zur Erlernung der Ankylostomidose in Adjaristan. [**Notes on Ankylostomiasis in Adjaristan.**—*Nachrichten d. Tropischen Medizin.* Tiflis. 1929. Mar. Vol. 2. No. 3. [In Georgian script. German summary p. 261.]

In 6 schools about Batum 630 children were examined, the method being by smear and Fülleborn's floatation. The average hookworm infection was 52·8 per cent., but in one spot it was 100. Other figures are ascaris 63·6, trichuris 77·8, *Hymenolepis nana* 2·5, *Enterobius vermicularis* 94. In hookworm cases haemoglobin lay between 45 and 28 in four, eosinophilia average 16, and necator comprised 91 per cent. of the worms recovered from them.

C. L.

MUDSCHIRI (M.). Ueber die Verbreitung der Ankylostomidose und anderer Darmwürmer im Adjaristan. [**Distribution of Ankylostomiasis and Other Intestinal Worms in Adjaristan.**—*Nachrichten d. Tropischen Medizin.* Tiflis. 1929. Feb. Vol. 2 No. 2. [In Georgian script. German summary p. 180.]

Examination of smears showed 100 per cent. of children from nine schools infected with the common intestinal nematodes. In Batum, there was in addition a hookworm infection of 62·7 per cent. this infection too being widespread. It is noted that the real percentage of infection must be much higher.

C. L.

DUBROWINSKI (S. B.), KRANZFELD (A. M.), ROSENFELD (W. D.) & SALAMANDRA (E. G.). Zur Hakenwurmverbreitung in Turkmenistan. [**Distribution of Hookworm in Turkmenistan.**—*Cent. f. Bakt.* I. Abt. Orig. 1928. July 25. Vol. 108. No. 1/4. pp. 172-177. When 1 text fig. [State Inst. for Sanitation & Hyg., Moscow.]

The diagnostic method used was the Kofoid-Barber-Fülleborn one, which seems to mean Fülleborn's floatation technique. It was compared with a smear made from the precipitate in a faecal suspension. The latter showed 21 per cent. of the population carrying ascaris infection mostly by unfertile eggs; while the former was negative, but Telemann's method seems to have given 2 more positives for hookworm eggs in 24 examinations than did Fülleborn's. In two boys who were treated, the hookworms recovered were *A. duodenale*. The rectal probe gave eggs of *E. vermicularis*. [A 21 per cent. infection mostly by unfertile and presumably solitary ascaris females is most unexpected.]

C. L.

- i. VOSKRESSENSKI (B.). La faune helminthique chez les populations rurales en Azerbaïdjan. [**Worm Findings in Azerbaijan.**—*Arch. Inst. Microbiol. et Hyg. d'Azerbaïdjan.* 1929. Vol. 1. No. 1-2. pp. 3-10. With 1 map in text. [In Russian. French summary pp. 145-147.]
- ii. ZDRODOWSKI (P.) & VOSKRESSENSKI (B.). Ankylostomose et son épidémiologie dans le district de Lenkoran en Azerbaïdjan.—*Ibid.* pp. 11-44. With 2 maps in text. [In Russian. French summary pp. 147-150. With 1 map in text.]
- iii. YAGOUBOFF (F.). Sur le caractéristique de la faune helminthique et spécialement de l'ankylostomose dans le district de Zakataly en Azerbaïdjan.—*Ibid.* pp. 45-52. [2 refs.] [In Russian. French summary p. 150.]
- iv. VOSKRESSENSKI (B.). Les observations cliniques et celles du laboratoire sur l'ankylostomose.—*Ibid.* pp. 53-78. [In Russian. French summary pp. 151-153.]

It is difficult to determine to what extent the numerous reports appearing from Azerbaijan are merely restatements.

i. This deals with 15,010 persons examined in 1927-28 in rural districts. Infected were 88.3, with trichuris 75.8, with ascaris 38, with hookworms 27.4, all percentages, together with many more infections. The methods were Fülleborn's and Telemann's.

ii. Presumably by the same diagnostic methods, 5,720 examinations in Lenkoran exhibited hookworm infection in 747. They were treated with thymol and carbon tetrachloride and an average of 210 worms per head recovered. Most infections lay between 101 and 500 by this test, but no indication of dosage or of determination of disinfection has been traced in the abstract, so that it is unnecessary to consider here the relationship described between worms and anaemia.

iii. In Zakataly 900 mussulman peasants examined by Fülleborn's technique were all infected with some intestinal parasite. Hookworms parasitized 30 to 72 per cent. of them; ascaris 78.7 per cent.

iv. The last note refers to Lenkoran. Stoll's figure of 44 eggs per gram per female hookworm did not apply. The figure was about 100, the infection being 30 per cent. by ancylostomes and 70 per cent. by necators. Thymol gm. 4 and carbon tetrachloride 1.5 cc. were the treatments given. Their results are not distinguished, but worms were recovered on consecutive days in these percentages: first, 78.6; second, 18.7; third, 2; fourth, 0.05 [sic], fifth, 0.2.

C. L.

KOBAYASHI (Toshizo). Sur les phénomènes régénératifs des hématies dans les anémies de l'ankylostomiase. [**Regenerative Phenomena of Blood Cells in the Anaemia of Ankylostomiasis.**—*Le Sang.* 1929. Vol. 3. No. 2. pp. 129-148. With 3 figs. [59 refs.]

"Seven cases of anaemia due to ankylostomiasis" form the basis of this study. The blood conditions after a vermifuge were as follows. Absorption of oxygen by red corpuscles remained high. Reticular erythrocytes remained normal or might be slightly increased in numbers. Resistance to haemolysis remained high. Bile in blood and urine remained normal. Anaemia was not improved. After administration of iron there was rapid blood regeneration and disappearance of the anaemia.

C. L.

TSUNASHIMA (Yoshito). On the Blood-Picture (especially Blood-Platelets and Reticulated Red Cells) and Blood Sedimentation of an Ankylostomiasis Patient.—*Arb. a. d. Med. Univ. zu Okayama*. 1929. June. Vol. 1. No. 2. pp. 158–165. [25 refs.] [Med. Clinic, Univ., Okayama.]

In ten healthy men the number of blood platelets varied between 260,000 and 300,000, presumably per cmm. Of 24 ankylostomiasis cases there were less than 300,000 in three of them [two of these, however, were tested only after disinfection], between 300,000 and 400,000 in 14, and between 400,000 and 500,000 in 7; for the summary should not be followed here. Eosinophils lay between 2·3 and 35·0 per cent. Blood sedimentation was more rapid as anaemia was greater.

C. L.

SAKARAJA (E.). E[i]nige Worte anlässlich der chirurgischen Bedeutung der Ankylostomidose. [**Significance to the Surgeon of Ankylostomiasis.**]—*Nachrichten d. Tropischen Medizin*. Tiflis. 1929. Feb. Vol. 2. No. 2. [In Georgian script. German summary p. 181.]

The presence of ankylostomiasis has confused the writer's surgery; An apparently tuberculous peritonitis has cleared up after thymol. a superficial sore with recurring bleeding, and a pleuritic effusion, failed to heal without a course of thymol. A radical cure of inguinal hernia under local anaesthesia was followed by collapse, and a brilliant recovery after anthelmintic treatment.

C. L.

ALLAN (Wm.). Hookworm Disease causing the Blood Picture of Primary Hemolytic Anemia in an Infant.—*Ann. Intern. Med.* 1928. Feb. Vol. 1. No. 8. pp. 605–606. [4 refs.]

A twelve-months' old baby is concerned, with haemoglobin 47, red corpuscles 2,470,000, colour index about 1, leucocytes 12,000, polynuclears 56, small mononuclears 41, large mononuclears 2, neutrophilic myelocytes 1, eosinophils 0. Red corpuscles showed moderate variation in size and shape with some polychromasia; there were 360 normoblasts and 120 megaloblasts per cmm. Faeces were strongly positive for occult blood, the child being still almost exclusively breast fed, and "crowded with hookworm eggs." After treatments (one at least with 1 grain of thymol) covering 4 months, "all hookworms were expelled, and the child has been normal ever since."

C. L.

SMITHIES (Frank). Parasitosis of the Bile Passages and Gall Bladder. A Report upon 37 Instances of Protozoiasis and One Instance of Infestation by *Necator americanus*.—*Amer. Jl. Med. Sci.* 1928. Aug. Vol. 176. No. 2. pp. 225–253. [32 refs.]

"From a patient, at the fourth attempt to 'drain' his biliary tract [by duodenal sound] and after a seven-hour session with frequent intraduodenal stimulation with warm $MgSO_4$ solution, my associate, Dr. R. B. OLESON, recovered quite suddenly, approximately 2 drams of foul-odoured, greenish-grey, grumous pus. This came from the tube under pressure. Microscopic examination was made immediately. In one field were seven viable hookworms (*Necator americanus*) and in others several ova."

[That a microscope should be needed to determine the presence of adult *N. americanus* is astonishing and that seven specimens could possibly be seen in one microscopic field is impossible. Necator eggs do not hatch in the intestine. Possibly eggs and larvae of *Strongyloides stercoralis* were seen.]

C. L.

VON BÜLOW (T.). Tuberculose latente réactivée par le passage des larves d'ankylostomes à travers le parenchyme pulmonaire. [**Latent Tuberculosis reactivated by Passage of Ankylostome Larvae through Lung Parenchyma.**].—*Bull. Soc. Path. Exot.* 1929. Jan. 9. Vol. 22. No. 1. pp. 26-30.

Larvae unhesitatingly identified as those of "*Ancylostoma duodenale*" were found in sputum containing also acid-fast bacilli, while the stools contained hookworm eggs. The man was treated with oil of chenopodium, and 200 ampules of a preparation containing "phenol, iodine, arsenic, etc.," were injected. He recovered.

C. L.

LAMSON (P. D.), ROBBINS (B. H.) & WARD (C. B.). **The Pharmacology and Toxicology of Tetrachlorethylene.**—*Amer. Jl. Hyg.* 1929. Mar. Vol. 9. No. 2. pp. 430-444. [36 refs.] [School of Med., Vanderbilt Univ., Nashville.]

Tetrachlorethylene in stoppered amber bottles does not produce phosgene. It is insoluble and has a chlorine content of 85.5 per cent. Its absorption from the stomach of dogs is ordinarily inappreciable up to about 10 cc. per kilo, the animals appearing quite normal; but if fat be given signs of hypnosis are seen in all dogs at a dosage of 4 cc. per kilo or more. Cats and puppies show absorption to some extent, and mice and rabbits absorb rapidly. Absorption is tested thus. In a tracheotomized dog carbon tetrachloride appears in the breath within 15 minutes after its injection with a fine syringe into an exposed loop of intestine; tetrachlorethylene does not. If the quantity of carbon tetrachloride be increased, its excretion in the breath is not increased; but if the liver be cut out by an Eck fistula with tying of the portal vein, each addition to the amount of this drug injected into the gut is followed by a corresponding rise in its excretion. With tetrachlorethylene no such result follows; in doses up to 10 cc. per kilo injected into the intestine none of the drug was found in the breath by a method which can detect 1 part in 40,000.

Correlated with this, Lamson and his colleagues have found no definite pathological changes in the liver or kidneys. They corroborate the finding that there is no liver necrosis even after five to six hours of complete surgical anaesthesia or after several months of a dosage of 2 cc. per kilo given every two or three days. In dogs the livers show no change whatever. In puppies and cats there is a varying fatty metamorphosis, but they question whether the variation is more than normal; and the phenolphthalein retention test showed no significant loss of liver function. All kidney tests were negative, apparently in dogs; and there was no marked decrease in levulose tolerance. Neither cats nor dogs showed any appreciable increase

in the icteric index, nor significant changes in blood sugar or blood guanidine. "Tetrachlorethylene differs fundamentally from chloroform and carbon tetrachloride in causing no appreciable pathological and functional changes." But, on the other hand, "If the same intravenous dose which gave a marked fall in blood pressure when injected into the femoral vein is injected into the portal vein, no fall of blood pressure occurs, showing that the liver is able to take up this substance as it does carbon tetrachloride." The criticism seems justified in spite of the negative results of recognized liver-function tests that, if in certain unknown respects the organ is not functioning properly, there would, after all, be risk in the administration of tetrachlorethylene.

C. L.

MAPLESTONE (P. A.) & MUKERJI (A. K.). **Tetrachlorethylene in the Treatment of Hookworm Disease.**—*Indian Med. Gaz.* 1929. Aug. Vol. 64. No. 8. pp. 424–426. [5 refs.] [Calcutta School of Trop. Med., Calcutta.]

These authors consider the reports by others on the use of tetrachlorethylene against hookworms. They contrast their own result in 82 cases treated with 3 cc. of the drug, with those of 135 cases treated by them with carbon tetrachloride. In both series oil of chenopodium might or might not be added. The number of eggs was estimated by Stoll's caustic soda method before and after treatment. It showed a total of 1,308 eggs actually counted by the technique before treatment with tetrachlorethylene and of 517 after treatment, a difference which presumably implies a persistence of about 40 per cent. of the worms. The presence or absence of cure was tested by D.C.F., which showed that 79.3 per cent. of their patients remained infected after tetrachlorethylene and 52.6 per cent. after carbon tetrachloride. Speaking of the testing of the drug by others they write: "In none of the other instances which have been quoted [in the first part of the paper] for comparison has this method [D.C.F.] been employed. The great superiority of Lane's method over any other for demonstrating light infections is quite sufficient to explain the low percentage of cures in the writers' cases. It was the discovery of the ridiculously low rate of complete cure that even the most powerful vermifuges bring about when checked by the direct centrifugal flotation method that led the writers to make use of the percentage reduction in eggs as a test of drug efficiency." They instance a group of 12 cases in which Stoll's method showed 4 only infected, whereas D.C.F. showed that 11 actually were so. As regards toxic effects, these were checked in hospital cases as follows.

	Total.	Giddiness.	Vomiting.	Drowsi- ness.
Tetrachlorethylene, 3 cc. ...	38	6	1	1
Tetrachlorethylene and oil of chenopodium, 1 cc. ...	37	19	4	3

The addition of oil of chenopodium added then considerably to the toxic effects which were already evident when tetrachlorethylene was given alone.

C. L.

KENDRICK (J. F.). **The Treatment of Hookworm Disease with Tetrachlorethylene.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 483-488. [3 refs.]

In the Madras Presidency the necator-ancylostoma rate is about 19 to 1. The report deals with 119 prisoners in the Madras Penitentiary. Tetrachlorethylene, alone or with oil of chenopodium, was given fasting in 2 oz. of concentrated magnesium sulphate solution with 2 oz. of the same aperient on the next two mornings at 7. The men were locked up for those 3 days, and all stools were collected and washed. The efficacy of this treatment was tested by Schüffner's method of further treatment and of determining the percentage of the whole worm recovery which the first treatment disclosed. Schüffner's method was modified in two interesting particulars. D.C.F. was used to determine disinfection, and treatments were repeated "until no ova were demonstrable by repeated examinations by the Clayton Lane D.C.F. method." Judged by this standard tetrachlorethylene 2 cc. removed 88.9 per cent. of necators (88 per cent. of males and 89.7 per cent. of females) and 87.3 per cent. of ancylostomes (97.3 per cent. males and 79.5 per cent. females); for 3 cc. the figures were 89.8 (88 and 91.8) necators and 82.7 (86 and 80) ancylostomes; for 1.8 cc. of tetrachlorethylene and 0.6 cc. of oil of chenopodium 94 (92.1 and 96.2) necators and 48 (57.8 and 37.5) ancylostomes. The numbers treated in the three categories were 59, 30 and 30 and the total number of worms recovered 5,829. No fatalities and only one intoxication were observed in the series of approximately 1,500 treatments with 3 cc. of tetrachlorethylene.

C. L.

HALL (Maurice C.) & AUGUSTINE (Donald L.). **Some Investigations of Anthelmintics by an Egg and Worm Count Method.**—*Amer. Jl. Hyg.* 1929. May. Vol. 9. No. 3. pp. 584-628. [22 refs.] [Bureau of Animal Industry, U.S. Dept. of Agric., Washington, D.C. & Med. School & School of Public Health, Harvard.]

Investigations planned by these members of an expedition, sent to Nicaragua by the School of Hygiene and Public Health, Johns Hopkins University, with the support of the International Health Board of the Rockefeller Foundation, were much marred by a revolution. The method of egg diagnosis was by the small-drop caustic soda solution of Stoll and Hausheer [which counts 1/200 gm. of faeces], while worms were recovered by sieving all stools passed within 72 hours of treatment through 4 wire screens, the smallest having 100 apertures to the linear inch. A second ovum count was made 10 days after treatment with tetrachlorethylene and not less than 12 days after chenopodium.

In 10 soldiers treated with 3 cc. of tetrachlorethylene egg counts showed an average reduction of eggs of 87.65 per cent.; yet a table shows that 80 per cent. of them remained infected. Similarly tetrachlorethylene 3 parts and ascaridole 1 part were given to children in general dosage of 0.05 cc. for each year of age or 0.6 cc. for a child of 12. Of 21 cases completely examined by this method 3 showed more eggs after than before treatment, 2 showed the same numbers although one had passed 6 female necators, in 10 there were fewer eggs after treatment, and in 6 there were none on the second count. However, 3 of these last 6 showed eggs on a third examination even though this had been preceded by a second treatment. The number of children left infected by a single

treatment was therefore 18 of 21 or 85.7 per cent. The authors, however, prefer to stress the fact that a 74 per cent. reduction occurred in the number of hookworm eggs.

A significant observation is made in the treatment by carbon tetrachloride. In one case 90 eggs were counted per slide and 319 female necators recovered; in another with 44.5 eggs per slide only 3 female ancylostoma indicating "that the drug either displayed very dissimilar efficacies against the hookworms in these cases or else the correlation between the number of hookworms present and the slide egg counts is very slight" [see, however, Sarles's paper on p. 423].

Santonin did not give good results against ascaris. The dosage was 2 or 3 grains in the morning sometimes preceded by 2 grs. at night. Leche de higueron removes whipworms rather dependably but usually fails to remove all of them. Oil of chenopodium was shown by counts to be very effective against ascaris, little effective against whipworms, threadworms and tapeworms. Mercurochrome gave questionable results. Kamala failed in removing tapeworms from at least 2 of 3 children treated.

C. L.

CORT (W. W.), SCHAPIRO (Louis) & STOLL (N. R.). **A Study of Reinfection after Treatment with Hookworm and Ascaris in Two Villages in Panama.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 614-625. [9 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The village Sardina was "sanitized," that is had latrines, largely used; the village Marica Arriba had none, with much soil pollution. About 100 persons from each village were examined four times: first before treatment, and then at intervals of about 1, 2 and 7 months from the date of treatment. The second examination was never made less than two weeks from treatment. Each examination was by counting a two hundredth of a cc. of faeces by Stoll's caustic soda method; treatment was by "tetrachlorethylene, or a combination of this drug and oil of chenopodium for adults and oil of chenopodium alone for children," and only one treatment was given. The average counts of eggs in hundreds per cc. of faeces are seen in the Table, where the "total" applies to all persons examined, "sanitized families" to persons living in latrined houses with no evidence of soil pollution, while those "unsanitized" had evidence of soil pollution and so were not using their latrines. A number of families were evidently not classed under either subhead.

	Sardina.				Marica Arriba.			
	1st Count.	2nd Count.	3rd Count.	4th Count.	1st Count.	2nd Count.	3rd Count.	4th Count.
Hookworms, Totals...	196	60	80	103	130	64	75	101
In "Sanitized" families...	222	43	49	54	—	—	—	—
In "Unsanitized" families...	218	75	98	104	—	—	—	—
Ascaris, Totals...	232	72	158	485	161	115	94	131
In "Sanitized" families...	59	17	16	79	—	—	—	—
In "Unsanitized" families...	154	85	57	341	—	—	—	—

[These counts confirm, for those who are satisfied with this counting method as a measure of diagnosis, the well-known fact that an adequate latrine protects from hookworm reinfection.] A great rise in ascaris infection occurred also, it is stated, in untreated cases. As the totals show the treatment left at least 30 per cent. of the hookworms behind, judged by ovum counts.

C. L.

- i. SCOTT (J. Allen). **Host Induced Variation in the Growth Curve of the Dog Hookworm, *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 125–139. With 4 text figs. [10 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]
- ii. ——. **Further Experiments with Physiological Strains of the Dog Hookworm, *Ancylostoma caninum*.**—*Ibid.* 1930. Jan. Vol. 11. No. 1. pp. 149–158. [6 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

i. Two strains of infective larvae were employed in these experiments, the progeny of *A. caninum* which had lived respectively in a dog and a cat. About 2,000 adults, which were recovered after the larvae had infected cats or dogs, were measured. Each strain infected readily the host species from which it had been obtained, and with difficulty the other host species. Both strains grew considerably more slowly and took longer to reach maturity in cats than in dogs, and in both the final size was smaller in cats than in dogs; but when a cat strain grew at all in dogs, it appeared to grow as fast and to become as large as did the dog strain in dogs. The difference was then conditioned by the host rather than the parasite.

ii. Further attempts were made to determine what these strains meant. After passing one to three generations in cats the dog strain did not appear to grow up in cats more, or dogs less, readily. In a single experiment the cat strain, after one generation in a dog, showed greater infectivity to dogs and less to cats. Young worms which had completed their last ecdysis were removed from the intestine of killed hosts and fed in gelatine capsules to others. They comprised males of one strain and females of another. The new hosts were later killed at intervals varying between 3 and 21 days. The surviving worms numbered 0 to 69 per cent. of those swallowed. The percentage of 69 was obtained 3 days after transfer, one of 55 seven days after, others of 1, 10 and 0 after 16, 19 and 21 days respectively. It is not stated whether any worms had become fertile from these experimental attempts to obtain a fertile cross between the two strains. They had to be abandoned owing to change in the author's duties.

C. L.

- SARLES (Merritt P.). **Quantitative Studies on the Dog and Cat Hookworm, *Ancylostoma braziliense*, with Special Emphasis on Age Resistance.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 453–475. With 1 text fig. [34 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

A. braziliense has not been found naturally in the region from which animals were obtained for this work. Dogs and cats were infected, in all but 2 instances, by infective larvae of worms developing in the cat. No difference was discovered in their infectivity to dog and cat. The

first appearance of ova was noted by D.C.F. ; they were numbered by duplicate Stoll counts of 1/200 gm. each. The worms themselves were collected at autopsy. Their habitat was predominantly in the upper half of the small intestine where they produced no visible haemorrhage, a contrast to the habitat of *A. caninum* in its lower half with its " bloody intestinal picture." The mean length of infective larvae is 0.656 mm. They were fed to experimental animals in gelatine capsules. Eggs first appeared in kittens or puppies 14 to 16 days after infection, in adult cats in 18 to 25 days. The eggs output reached its maximum in 3 kittens on days 22, 24 and 25 and in three cats on days 24, 34 and 37. In the kittens this maximum output averaged 615 per day for each larva given, and in cats 206. The period after infection during which eggs were passed did not exceed 32 weeks. Judging by 10 cats, the average number of eggs per female worm was 321.5 at about 3 weeks after infection, 2,448 at about 6½ weeks, and 4,244 at about 7½ weeks. The egg output varied, then, with the age of the worms. Males and females were roughly equal in number except with very small infections. In 8 kittens 8.5 to 61.6 per cent. of larvae developed into adults, in 7 cats the numbers were 0 to 20.8. There is then an age resistance to oral infection.

C. L.

- i. SARLES (Merritt P.). **The Effect of Age and Size of Infestation on the Egg Production of the Dog Hookworm, *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 658-666. [20 refs.]
- ii. —. **The Length of Life and Rate of Loss of the Dog Hookworm, *Ancylostoma caninum*.**—*Ibid.* pp. 667-682. With 4 text figs. [11 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

i. D.C.F. was used to determine whether dogs were infected. If so they were treated and no infection experiments were carried out " until they had remained negative to repeated D.C.F. examinations for at least two weeks." The egg output was measured by two counts each of 1/200 gm. of faeces in decinormal caustic soda solution (Stoll Hausheer). The worms were obtained from the intestine after killing the dogs. A most important finding is that egg production in *A. caninum* was much less in large infestations than in small ones. Figures for seven natural infestations of unknown age are as follows :—

Total.	Worms.		Eggs per day per female.
		Females.	
2		1	24,900
3		2	20,500
28		16	26,800
33		20	12,900
37		21	15,900
206		94	7,900
326		187	4,500

Experimental infections showed the same feature. For instance, in a group of dogs with worms 31 days old, one dog with 14 worms (5 females) gave an egg output of 28,400 per female, while one with 174 worms (90 females) gave an output per female of 7,200. With

worms of that age in six dogs with an infection of less than 50 worms each, the daily egg output was 12,900 per female worm; in nine dogs with more than 200 worms the corresponding figure was 4,411. The highest egg output was reached about a month after infection.

ii. The appearance and disappearance of eggs was determined by D.C.F., egg numbers by two counts each of caustic soda suspension corresponding to 1/200 gm. of faeces (Stoll and Hausheer). "Egg counts were not corrected to the basis of formed faeces, as HERRICK found this to be unnecessary in dog hookworm infestations." First infections were by oral administration in double gelatin capsules of approximately 500 larvae of *A. caninum*. Eggs continued to be found for 43 to 84 weeks by the Stoll method and for 43 to 100 weeks by D.C.F. Their quantitative rise and fall are clear from this table, the figures being obtained by Stoll counts.

Weeks after infection.	Dog 79.	Dog 80.	Dog 81.	Dog 82.	Dog 84.
4 ...	23,100	10,300	11,400	17,400	11,900
12 ...	14,300	23,500	10,500	67,300	36,200
28 ...	2,900	7,200	2,500	3,000	2,600
42 ...	3,200	4,400	1,400	1,800	500
50 ...	1,400	1,900	300	0	300

As soon as the first infections had been lost a second was produced by similar means, but the larvae given varied in number from 435 to 9,000 in cases in which they were not vomited. The maximum egg output per larva administered had been 64 eggs per gram for the first infection; it was 0.25 egg per gram for the second. It is pointed out that this does not necessarily mean an immunity acquired as the result of the first infection, since the dogs were older and accordingly less susceptible; in one control dog of about the same age, the maximum egg count after swallowing 435 larvae was 3,100 per gram or 7 per gram per larva. The highest output in a second infection was 2,500 after 2,180 larvae or 1 per gm. per larva. Third and fourth attempts at infection with 16,300 to 23,500 larvae all failed to produce infections large enough to count by the Stoll-Hausheer method, though D.C.F. continued to show their presence. In one dog completely refractory to larval infestation by mouth or skin, 57 adult worms given orally by capsule showed sufficient eggs to be counted by the Stoll-Hausheer method for two weeks although D.C.F. recovered them for 17 weeks [and would have counted them with expedition if pushed to finality].

C. L.

SARLES (Merritt P.). **The Reaction and Susceptibility of Dogs of Different Ages to Cutaneous Infection with the Dog Hookworm, *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 683-692. [11 refs.] [School of Hyg. & Public Health Johns Hopkins Univ., Baltimore.]

" 1. In young dogs the penetration of the larvae either produced no local reaction or a very slight and transient one. 2. In old dogs there was an immediate local reaction to the penetration of the larvae followed by a violent and prolonged inflammation. Sections of the skin showed evidence of the destruction of the hookworm larvae during this process. 3. In young dogs the larvae migrated rapidly from the skin, through the lungs to the intestine, and only a small number were found in the skin later than the

first day after infection. 4. In the old dogs the larvae were retained in large numbers in the skin, although some succeeded in undergoing a delayed migration to the intestine. 5. The percentage development of the larvae following cutaneous infection of young dogs was much less than for oral infection of dogs of the same age. In old dogs the percentage development was very small by both methods, showing the presence of an age resistance. 6. A persistence of undeveloped larvae in the intestines of dogs following cutaneous infection was noted which substantiates the similar observation of Scott on oral infections."

C. L.

SARLES (Merritt P.). **Studies of the Blood Changes occurring in Young and Old Dogs during Cutaneous and Oral Infection with the Dog Hookworm, *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 693-704. With 4 text figs. [7 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

"Daily blood studies were made on young and old dogs during cutaneous and oral infections with *A. caninum*.

"Both oral and cutaneous infection of adult dogs caused a marked increase in the total number of leucocytes in the blood. There was an immediate decrease in the number of eosinophiles following both oral and cutaneous infection, succeeded by a gradual increase which produced an eosinophilia of 17 to 42 per cent. on the tenth to fourteenth day after infection. This change in the number of eosinophiles in the blood was very constant and similar in the six adult dogs studied.

"In young dogs cutaneous and oral infection failed to produce a marked eosinophilia and a leucocytosis was not a constant occurrence.

"Following cutaneous and oral infections of approximately 20,000 larvae less than 25 worms developed in the intestines of *adult* dogs, and no significant decrease resulted in the grams of hemoglobin or number of red blood corpuscles.

"Cutaneous and oral infections of approximately 10,000 larvae produced in *young* dogs infestations of over 1,000 worms and caused an acute and fatal anemia in the second week after infection."

C. L.

FÜLLEBORN (F.). Durch Hakenwurmlarven des Hundes (*Uncinaria stenocephala*) beim Menschen erzeugte "Creeping Eruption." [**Creeping Eruption produced in Man by the Dog Hookworm.**]—*Abhandl. a.d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26 (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 121-133. With 23 figs. on 6 plates. [16 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

In these sacrificial experiments, Fülleborn was both priest and victim and induced HERTMANN to share the latter useful but unpleasant role. Mature larvae of *Uncinaria stenocephala* of the dog were applied to the arm with or without scarification. In the case of the younger man (aged 28) there appeared early at the site of the application redness and wheals. On Fülleborn's arm repeated application of many larvae produced no such effect. The scarifications did not heal and a very irritable red and papular infiltration appeared round them. Thirteen days after the application, creeping eruptions began. For 24 hours the newly formed portion of a track was not reddened. Later it became distended and fluid exuded if it were broken. It was concluded that larvae were wandering, and were doing so in the epidermis, since local application of silver nitrate diverted the advancing

line of eruption. To make certain, Fülleborn further sacrificed two portions of his own skin, cut out under ethyl chloride, each 1 to 2 cm. long and 1 cm. broad, and serially sectioned them at a uniform spacing of 10μ . The track was thus reconstructed. It lay quite superficial immediately under the horny layer of the epithelium. At its spreading end it was narrow and was probably filled by the larva before this shrank in preservation. Where it was older it was distended and enlarged by fluid in which might be many leucocytes. The illustrations are excellent. "Heliobrom," silver nitrate and ethyl chloride spray are mentioned in treatment.

C. L.

WHITE (G. F.) & DOVE (W. E.). **A Dermatitis caused by Larvae of *Ancylostoma caninum*.**—*Arch. Dermat. & Syph.* 1929. Aug. Vol. 20. No. 2. pp. 191–200. With 5 text figs. [14 refs.]

Typical ground itch, without creeping eruption, occurred in a human volunteer after infective larvae of *A. caninum* were applied to the skin of the forearm.

C. L.

i. MCCOY (Oliver R.). **The Growth of Hookworm Larvae on Pure Cultures of Bacteria.**—Reprinted from *Science*. 1929. Jan. 18. Vol. 69. No. 1777. pp. 74–75. [2 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

ii. ——. **The Suitability of Various Bacteria as Food for Hookworm Larvae.**—*Amer. J. Hyg.* 1929. July. Vol. 10. No. 1. pp. 140–156. [14 refs.]

i. By straining, washing, centrifuging and floating in saturated salt solution with looping of the surface ova can be obtained almost entirely free from faecal matter. If "sterilized" with 5 per cent. antiformin or 10 per cent. formalin, 10 to 50 per cent. of ova remain viable. After thorough washing in sterile distilled water such ova are inoculated on to agar cultures. If nothing further is added embryos hatch normally, but do not grow. If then there be added pure cultures of certain bacteria, or if the eggs be placed on these originally, the larvae reach the infective stage, in normal times in the latter case. Such growth occurred in culture of *Bact. coli*, *B. subtilis*, *Eryth. prodigiosus*, *Bact. lactis aerogenes*, *Staphylococcus aureus*, *Vibrio metchnikovii*, *V. rubrum* and *Micrococcus citreus*. There was no development on *Ps. pyocyanea* or *Sarcina lutea*, and but little on *B. cereus* and *B. megatherium*.

ii. Eggs of *A. caninum* cleaned by floating and washing were added, together with pure cultures of 1 of 25 different species of bacteria, to agar. They developed best in *Bact. coli*, *Bact. lactis aerogenes*, *Bact. alcaligenes*, *Bact. cloacae*, *Bact. pneumoniae*, *B. mycoides corallinus*, and *Proteus vulgaris*, the first 3 being 3 of the commonest faecal bacteria. Bacteria freed from agar furnished sufficient food for growth to infectivity to occur; dead bacteria or the filtrate through a Berkfeld filter of normal saline suspensions of *Bact. coli* or *Bact. lactis aerogenes* allowed hatching of larvae but not their development. Autoclaving a mixture of charcoal and faeces, and adding hookworm eggs prove viable by controls, gave no development to infectivity though this took place

when *Bact. coli* were also added. "All the evidence from the experiment indicates that living bacteria constitute the essential food utilized by hookworm larvae in developing to the infective stage."

C. L.

WHITE (G. F.). **A Method for obtaining Infective Nematode Larvae from Cultures.**—*Science*. 1927. Sept. 30. Vol. 66. No. 1709. pp. 302-303. With 1 text fig. [7 refs.]

White describes an apparatus for trapping hookworm larvae as they escape from a culture. It consists of a dish in which the culture is placed, centred within another dish containing water, the whole being covered with a third. [An apparatus with precisely these characters was shown by the abstractor at the laboratory meeting of the Royal Society of Tropical Medicine and Hygiene on March 18th, 1926, and had been then in use by him for some time. Dr. KIRBY-SMITH attended this meeting. Dr. KIRBY-SMITH and Dr. White are collaborators. A year and a half after that meeting this note was published, and it contains the statement that the method described had been employed for a year and a half. Since no mention is made of the original apparatus it is clear that the long arm of coincidence is more active in real life than most novelists would dare to suggest.]

C. L.

PIRIE (J. H. Harvey), RETIEF (F.) & FERGUSON (A. L.). **Specific Skin Reactions in Ankylostomiasis.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1929. June. Vol. 9. No. 100. pp. 19-20. [2 refs.]

Antigen was prepared by desiccating washed hookworms over concentrated sulphuric acid, powdering, and extracting with Coca's alkaline saline solution under toluol. A drop of this extract was placed on a scarification and the reaction noted half an hour later. "If the results of this test of ours had been used to indicate the necessity for treatment or otherwise, it would have meant that out of the 100 boys, 17 with ankylostome ova in their stools would have been treated; 27 cases showing no ova would also have been treated; and 15 with ova would have escaped treatment." The method of diagnosis is not stated so that no guess can be made as to the number of apparently uninfected who were really so.

C. L.

KAWANISHI (K.). **Experimental Studies on the Entrance of Pathogenic Bacilli incidental to Percutaneous Infection with Hookworm.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1929. Sept. No. 294. [In Japanese. English summary pp. 50-51.] [Govt. Med. College, Taihoku, Formosa.]

According to the English summary, on the surface of ankylostome larvae many bacteria are found; they survive there as long as they do in soil; and are not removed by washing, by passage through agar, or through the skin. Typhoid bacilli were found in various organs of the guineapig within an hour of smearing them and infective larvae on the skin. No bacteria were found within the larvae which possess a bactericidal ferment. [No note in the summary indicates whether larvae were sheathed or unsheathed.]

C. L.

ORISO (T.). [Experimental Studies on Oral Infection with *Necator americanus*.]—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1929. Sept. No. 294. [In Japanese. English summary pp. 52-53.] [Govt. Med. College, Taihoku, Formosa.]

In dogs fed with hookworm larvae pulmonary migration was less vigorous in *necator* than in *A. duodenale*. In rabbits, guineapigs and mice most larvae were passed dead per rectum but a few reached the lungs.

C. L.

GARIN (Ch.), DOUBROW & MOUNIER. Larves vivantes d'ankylostomes, trouvées dans le fond d'une mine infestée. [**Living Ankylostome Larvae found in an Infested Mine.**]—*Lyon Méd.* 1928. June 3. Vol. 141. No. 23. p. 633. With 2 figs. on 1 plate.

Of the many larvae recovered from a mine one is illustrated by a photomicrograph. The shape of its tail is not that of the hookworm larva.

C. L.

FISCHER (W. O.). Ueber eine Methode zum Abtöten von Hakenwurm-larven im Boden. [**Method of Destruction of Hookworm Larvae in Soil.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Apr. Vol. 32. No. 4. pp. 163-175. With 3 text figs. [Dept. of Sanitation, Rand Mines, Ltd., Johannesburg.]

Fischer demonstrated [as LAMBINET had done more than 20 years earlier] how destructive is salt to eggs and larvae of hookworms.

C. L.

MICHELETTI (Ettore). Intorno ad una nuova specie di anchylostoma. [**A New Species of Ancylostoma.**]—*Ann. di Med. Nav. e Colon.* 1929. Nov.-Dec. Year 35. Vol. 2. No. 5-6. pp. 246-257. With 7 figs. on 1 plate. [7 refs.] [Inst. of Med. Parasit., Univ., Rome.]

Ancylostoma mephitis, n. sp., is described from the skunk *Mephitis zorrilla*. All details given appear to apply to all known species of the genus except that *A. mephitis* is described as having on each side only two subventral adoral teeth, the rudimentary inside one of *A. duodenale* not being reported. Its length is: Male 12 mm. to 15 mm., female 15 mm. to 18 mm.

C. L.

REVIEWS AND NOTICES.

SCHILLING (Victor) [Professor Dr., Physician-in-Chief, the First Medical University Clinic, Charité, Berlin]. **The Blood Picture and its Clinical Significance (including Tropical Diseases). A Guidebook on the Microscopy of Blood.** Translated and Edited by R. B. H. GRADWOHL, M.D. Seventh & Eighth Revised Edition.—408 pp. With 44 illustrations & 4 colour plates. 1929. London: H. Kimpton. [42s.]

This book is subdivided into four sections, the first dealing with haematological technique, and the second with the theory, morphology and classification of the blood picture. The third and fourth parts are concerned with the fundamental principles underlying the haemogram and its practical application to clinical work. For reasons that are not obvious a new test known as the guttadiaphot is given considerable prominence in the introductory chapters. In the author's opinion the haemogram, the sedimentation test, the guttadiaphot and the Wassermann reactions supplement each other in a very helpful way.

Schilling believes that platelets arise during the process of denucleation of the primary erythrocyte and holds that nucleated red cells only become pathological when they appear in the peripheral circulation. Emphasis is placed on the fact that the diagnosis of megalocytic anaemia may be made from a study of the blood film but not that of cryptogenetic pernicious anaemia since similar pictures may arise in the course of lues, pregnancy, carcinoma, sprue and dibothriocephalus infestation. No reference is made either to the Price-Jones curve or to other methods of estimating the diameter of red blood corpuscles. The leucocytic blood picture including the usual differential count introduced by ERHLICH is discussed at length. ARNETH observed that in most infections or toxic diseases there is a transformation of the nuclei of neutrophils from segmented forms to a simple sausage, bean or ball shape and demonstrated that if the neutrophils were arranged schematically from left to right according to the number of their lobes a shift to the left occurred. On the other hand, in another group of diseases including beri-beri, scurvy, sprue and pernicious anaemia a shift to the right with increase of highly segmented cells was observed. ARNETH demonstrated changes in the entire neutrophil group of cells, but Schilling regards this complex nuclear scheme with its 24 subdivisions as theoretical and denies that the pathological forms in a shift to the left are necessarily young forms. Schilling in his haemogram classifies all the cells with two or more irregular lobes in the nucleus into one group of segmented polymorphs (S) and divides the others into neutrophilic degenerative stab or staff forms (St), regenerative juvenile forms (J) corresponding closely to the metamyelocytes of Pappenheim, and myelocytes (M). While ARNETH takes into account only a juvenile shift to the left, Schilling distinguishes between a regenerative shift on the one hand and a degenerative shift on the other. Regenerative shift is associated with a leucocytosis and is characterized by the appearance of juvenile cells which are not usually present; it represents increased regenerative activity of the bone marrow and is especially characteristic of septic diseases. Degenerative shift is associated with an increase of stab forms and is an expression of defective neutrophil leucopoiesis. It is met with in typhoid, kalaazar, and tuberculosis. The differential count of the neutrophils is nearly always decreased and the total count diminished except in high grade lymphocytosis. Actually in normal practice most infectious shifts are mixed forms. Normally, the ratio of pathological shift cells (M.+J.+St) to normal cells (S) is 1:16 and reasonable variations in this index may be used to estimate the degree of pathological shift in the haemogram.

The Schilling index and haemogram are less cumbersome than Arneth counts, and undoubtedly afford information of considerable practical value. These studies, however, are essentially clinical and would have gained much in value if more pathological evidence regarding the various degenerative and regenerative changes in bone marrow so glibly referred in the text as underlying the various blood pictures had been forthcoming. As a guide to the microscopy of the blood this book cannot be recommended. It has been written from too focal a viewpoint and fails to survey much available haematological data. Furthermore, it is handicapped by an entire absence of reference to all English and American literature dealing with this subject. Mistakes in the text are common and in this and other directions Gradwohl's translation leaves considerable room for improvement in subsequent editions.

N. Hamilton Fairley.

TALIAFERRO (William H.) [Ph.D., Professor of Parasitology the University of Chicago]. **The Immunology of Parasitic Infections.**—pp. xv+414. With 28 figs. The Century Biological Series, Robert Hegner, Editor. 1929. The Century Co., New York: London. [\$6.00.]

In the preface the author points out that this work is not intended to be a treatise on immunology, but a compilation and evaluation of the mass of immunological data bearing on infections with animal parasites. The introductory chapter deals with some fundamental concepts of parasitism, infection and immunity. Then follows an important section on biological aids to diagnosis, including a review of the complement fixation, agglutinin and precipitin reactions and various miscellaneous tests.

In Taliaferro's opinion the specific complement fixation reactions reach their highest degree of perfection in hydatid disease and the schistosome infections of man, and in trypanosomiasis of horses, information of the utmost value being afforded. Sporadic studies on malaria and kala azar have elicited no significant specific tests, but the formol-gel reaction in the latter disease receives favourable comment. It is interesting to note that yaws is regarded as the only disease other than syphilis likely to yield positive results with a modern Wassermann technique.

Lysins and reproduction-inhibiting antibodies in malaria and trypanosomiasis are fully considered, as are also the protective and curative action of immune sera in the latter disease. There is an instructive chapter on hypersensitiveness and the various cutaneous tests applicable to helminths, and the opinion is expressed that no field of parasitic immunity offers promise of more interesting practical and theoretical results. Abnormal skin sensitiveness may manifest itself as local anaphylaxis (Arthus phenomenon), as an immediate wheal or as a delayed reaction. The latter appears more frequently in protozoal and bacterial infections, the immediate wheal in infestation with the intestinal worms, while both types occur in hydatid and schistosomiasis. The clinical value of these reactions is discussed but the view that the intradermal test is proving more reliable than the complement fixation reaction in echinococcosis is hardly in accord with recent publications on this subject. Eosinophilia is regarded as being dependant on previous sensitization to foreign protein and the obvious similarity of protein wheals to those arising from the bites of insects is commented on. Evidence is cited showing that these result only in persons previously bitten.

Parasites may exert deleterious effects on the host by the production of endotoxins, exotoxins or protein products. Malarial paroxysms are related to the periodic liberation of foreign protein into the blood stream the symptom complex really being of anaphylactoid origin, while in sarcosporidia a true exotoxin known as sarcocystin is produced.

In the past, the physiology and the immunological study of the animal parasites have been largely sacrificed on the altar of morphology, and in this respect both helminthology and parasitology have lagged far behind their sister science of bacteriology. The need for some authoritative work on parasitic immunology has long been felt by workers in this field of enquiry, and Professor Taliaferro is to be heartily congratulated on having achieved this objective in the limited space of three hundred and eighty-six pages, seventy-five of which are devoted to bibliography.

N. Hamilton Fairley.

CORT (W. W.), STOLL (N. R.), SWEET (W. C.), RILEY (W. A.) & SCHAPIRO (Louis). **Studies on Hookworm, Ascaris and Trichuris in Panama. Embodying the Results of the Researches of an Expedition to the Republic of Panama, May to September, 1926.**—*Amer. Jl. Hyg.* Monographic Series. 1929. Jan. No. 9. pp. vii+215. Ill.

There are discussed the situation in Panama with relation to the hookworm problem; the laboratory methods used which included a Stoll-Hausheer count and a Willis examination for iced stools at the rate of over 200 a week; stool size in its relation to eggs in the faeces; the correction of hookworm rates for age and sex; an analysis of hookworm infestation in areas in Panama uninfluenced by control measures in which reliance on the accepted worm-ovum ratio lead to the conclusion that "the size of the infestations in young children in this area is perfectly extraordinary"; the effect of treatment and sanitation in which is stressed the ineffectiveness of treatment without sanitation, "such methods have long since been abandoned in well organized control programs"; the haemoglobin level as a measure of intensity of hookworm infection, which is believed to hold in some provinces and not in others; the distribution of ascaris and trichuris, which have not been influenced by the introduction of the type of latrine used. [STILES showed long since grave reasons for considering ascaris as a privy-spread disease.]

Clayton Lane.

DE MOOR (Cornelis Ewout). **Het rhinosclerom, in het bijzonder in de tropen.** [Rhinoscleroma and its Occurrence in the Tropics].—*Academisch Proefschrift.* Amsterdam.—pp. xi+159. With 45 figs. on 7 plates & 4 folding tables.

At the outset, in looking through this work, one is struck by its description as a thesis to be defended publicly in the hall of the university of Amsterdam at a given hour and on a given date. This is the usual formula and procedure for doctorate theses. That the defence was well sustained is borne out by the text. Rhinoscleroma is now a well-characterized disease. The first three chapters, which deal with pathological anatomy and clinical appearances, bacteriology and epidemiology, present with very full reference to the literature all the facts known in regard to the disease. Cases found in the Dutch East Indies, and not yet published, formed the occasion for the thesis, which deals in its later chapters with the question of their identity with the well-known European form. The disease itself is one of the infective granulomata, affecting especially the skin or mucous membrane of the nose, but also other parts of the respiratory passages. Tissue lesions are characterized by a dense infiltration with plasma cells and the occurrence of the so-called Mickulicz cells. These have been regarded as enlarged plasma cells, endothelial cells and as macrophages. It is probable that they represent degenerated macrophages of endothelial or connective tissue origin. Much interest centres round the existence in the lesion of a capsulated bacillus, first discovered by v. Frisch. It evidently belongs to the group of organisms of which the pneumobacillus of Friedlaender

forms the type. All the facts for and against the specificity of this bacillus of rhinoscleroma (*Bacterium rhinoscleromatis*) are very fully considered. There seems no doubt about the constancy with which it can be isolated in pure culture; the main subject for discussion is whether it can be regarded as the primary cause or is merely a secondary invader.

Extensive researches of the author into the literature of the distribution of the disease and its epidemiology are contained in the third chapter. The best known and oldest focus is that which covers a considerable area in the east of Europe, but it is probable that it has a very much greater geographical extent than is commonly recognized. The cases occurring in Sumatra are probably only indicative of a better recognition at the present day and more frequent publication. It is a disease especially of poverty-stricken populations. In England there is record of a case shown before the Pathological Society of London in 1885 and of the affection of two sisters (1889) in Newcastle, whose nationality is not given. A very considerable endemic area seems to exist in Central America. North American cases are derived almost entirely from emigrants from East Europe. Tropical Asia possesses a focus in Bengal (Calcutta).

Six cases of rhinoscleroma have been diagnosed on the East Coast of Sumatra since SNIJDERS and STOLL described the first in 1918. The disease probably passes from case to case by contact infection. Two chapters, preceding the final summing up are occupied with the detailed consideration, clinical and bacteriological, of the cases which have occurred in Sumatra. The last short chapter gives the summary and conclusions of the author, which briefly are that the capsulated bacillus of rhinoscleroma is the primary and specific cause of the condition and that rhinoscleroma is much more widely existent in subtropical and tropical regions than is generally realized.

This monograph may be taken as an exceedingly comprehensive and critical treatment of the subject of rhinoscleroma in general and as a well contested disputation on its title to be included among tropical diseases. It is somewhat extraordinary to read that so disfiguring and definite a disease receives no mention in handbooks devoted specially to tropical diseases.

W. F. Harvey.

THOMSON (David) [O.B.E., M.B., Ch.B. (Edin.), D.P.H. (Camb.)] & THOMSON (Robert) [M.B., Ch.B. (Edin.)]. **The Pathogenic Streptococci. Their Rôle in Human and Animal Disease (Continued).**—*Ann. Pickett-Thomson Research Lab.* 1929. Oct. Vol. 5. pp. ix+392. With 1 text fig., 5 charts & 46 plates. London: Baillière, Tindall & Cox. Baltimore: Williams & Wilkins Co. [£2. 2s. 0d.]

This is the fourth successive volume of these Annals dealing with streptococci and the intention of the authors to present, in the end, a complete monograph of the genus will require, we learn, at least two further volumes. It is difficult to say much that is new about the present volume, since it follows precisely on the lines of those which have gone before. It has, in our judgment, the same very definite merits and the same defects; it is published, too, at the same prohibitive price—one which places it out of the reach of that wide circle of laboratory workers for whose benefit we must conceive it to have been written. The authors still exhibit the same easy confidence that the classification of the streptococci can be achieved by the photography of their colonies on Warren Crowe's special blood agar medium, and it must be admitted that, granting this premiss, the photographs which freely illustrate the volume are, if possible, even better than their predecessors.

The practice of the authors is to group the streptococci on the basis of the morbid conditions to which they give rise, and we have in the present

instalment three separate monographs, each of much interest. The first is on oral and dental sepsis, including dental caries, pyorrhoea alveolaris, apical infections and periodontal suppurations. The second monograph deals with the part played by streptococci in tonsillitis and pharyngitis. Scarlet fever is deferred for a future monograph, and the most important subject here dealt with is the relation of haemolytic streptococci to follicular and septic tonsillitis. The last monograph is on a subject at present much in the public eye, name, puerperal sepsis. The overwhelming importance of *Streptococcus pyogenes* in serious puerperal sepsis is well brought out, though the share of other species is not neglected.

[Abridged from review by Sir F. W. Andrewes in *Bulletin of Hygiene*, 1930. Apr. Vol. 5. No. 4. p. 344.]

HELLERSTRÖM (Sven). A Contribution to the Knowledge of Lymphogranuloma Inguinale.—*Acta Dermato-Venereologica*. Stockholm, 1929. Supplement I. 224 pp. With 7 colour-photographs & 9 microphotographs in black & white.

The title of this work hardly gives a correct conception of what is in reality a monograph on a disease which has recently attracted much attention in all countries. The disease is one for which many names have been suggested and the author has selected that one which he considers least open to criticism. Quite a large literature has grown up in the last few years dealing with this affection in European countries and elsewhere outside the tropics from the pens of observers who were probably unfamiliar with the condition known to practitioners in warm countries as climatic bubo and it is only quite recently that the two have been recognized as one and the same morbid entity. This is very well shown in the author's full historical survey in which he also shows that the growing literature speaks not only for wider recognition of the disease but for a wider distribution than formerly. The final proof of the unity of the two conditions, short of finding a single specific organism in both, the author finds in the results of crossed intra-cutaneous tests. He has been unable to confirm some other observers in finding a specific virus.

Hellerström's clinical and pathological findings are in conformity with those of others but the full notes of 48 cases (80 pages) form a valuable contribution to the subject. He advocates early complete enucleation of the affected glands as routine treatment but it is a little disappointing to find that no trial was made of intravenous non-specific shock therapy—T.A.B. vaccine. In conclusion one would like to welcome this volume from Stockholm written in English with French and German summaries and draw attention to the very beautiful coloured photographs.

H. S. Stannus.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. The Fight against Leprosy. Being the Annual Report for 1929.—44 pp. With 8 figs. & 1 map. London: 29, Dorset Square, N.W.1.

The annual report for 1929 of the British Empire Leprosy Relief Association forms an attractive booklet. The Association was formed to give every leper the opportunity of treatment and to devise a system which would result in the control and ultimate eradication of leprosy from all parts of the King's dominions. It promotes the establishment of branches in British possessions where leprosy is rife, assists them financially as far as its funds permit, supplies them with curative drugs and with seeds of the trees which produce the curative oils, and with books and pamphlets, such as the Summaries of Recent Work published in this *Bulletin*. In the year under review £722 were spent on drugs and £387 on literature,

while the financial grants amounted to £3,725. Its Secretary, now Dr. COCHRANE, stimulates Governments by personal visits. A list of the branches at home and abroad, with the office-bearers, is given. The accounts show that whereas £6,756 was received from various sources, the Association spent £7,936, an excess of £1,180. There is, therefore, a call for more subscriptions, but it may be suggested that Colonial Governments might do more, for while private subscriptions from Great Britain amounted to £1,846 the grants from Colonial Governments (5) only reached £375.

A. G. B.

BANERJI (Paresh). **Handbook of Snake-Bite.**—pp. xvii+430. With 20 plates (12 coloured). 1929. Published by P. Banerji, Mihijam (India). [Rs.10. (16s. 6d.)].

Out of 428 pages, 68 contain a certain amount of more or less correct information about poisonous snakes and the effects of snake-bite. The list of snakes as geographically distributed is taken from BOULENGER (1890). Some of the coloured plates by S. DAS are quite good. The rest of the book is devoted to the fervent advertisement of "Lexin," "a medicine invented by the writer and believed by him to be the real specific for snake poisoning." Experiments made on dogs and guineapigs failed because they could not be made to inhale the drug properly. The so-called case reports tell us that a cow was cured (349) when Lexin was poured into its nostrils and also that an infant too young to inhale was cured of snake-bite by rubbing Lexin into the skin. Many of these case reports—1,134 in number—are obviously worthless, as no snake was seen and there is no evidence of actual snake-bite; in many the name of a snake is given. Again some of these case reports refer not to snakes, but to scorpions and centipedes. One is a letter from a woman saying she has sold so many bottles of Lexin and wants more! A full description of Lexin and its chemical virtues is given in Chapter 1. Lexin is composed of: rectified spirit, HCl; sublimate camphor; trichloride of gold, pyoktanin, and the hydrochlorides of penta and hexa-methyl-para-amido rosanilines.

Anti-venin sera and other remedies are mentioned in the book, but not with any enthusiasm!

We will end with a quotation from the single page which is given to non-poisonous snakes:—

"Ticks from a venomous snake come to live in the body of a non-venomous one and infect the latter, and after a certain length of time the saliva of the snake becomes toxic on account of the presence of the new arrivals."

J. H. Tull Walsh.

NETHERLANDS INDIES MEDICAL AND SANITARY SERVICE [Edited by]. **Control of Endemic Diseases in the Netherlands Indies.**—77 pp. With 3 folding maps, 29 photos & 10 figs. 1929. Landsdrukkerij-Weltevreden.

It is impossible to give in a short review an adequate account of the contents of this book, which sets out the measures in active employment in the Dutch East Indies for the control of the common bacterial and parasitic diseases of the tropics. The Dutch medical staff have satisfied themselves that only educational methods can succeed in combating hookworm disease and that the sound plan is to use such methods alone, unaccompanied by an intensive latrine-building and treatment campaign. An interesting note is given regarding two neighbouring districts. "In the one it was done on a grand scale, was instituted in many place simultaneously, and the full

co-operation of the Government officials, both European and native, was obtained so that, after a large number of lectures and in a short time more than 150,000 people were treated and 40,000 new latrines were built to conform to the conditions laid down. A law, providing for the punishment of those polluting the water and the ground, was also considered. In the other residency the administration also rendered all possible assistance, but here, at the urgent request of the regional Government physician, under whose supervision the service worked there, everybody refrained from exerting pressure of any kind. If the people did not do it of their own accord it was not appreciated. The results in this district were, in proportion, very poor. The number of people treated and especially the number of newly constructed latrines was, in any case, considerably less.

"On the occasion of an inspection at a later date it was found that all the model latrines had remained unused and that the apparently wonderful success had, in reality, not been achieved at all. In the other residency, where the activities had been patiently limited to a few *dessas*, the confidence of the people had finally been won and the latrines which were built were used exclusively, for the simple reason that the people realised the necessity for them. It went even so far, that the teachings were spread further by the inhabitants themselves, and in neighbouring villages, where the service had not yet been active, the inhabitants were already busy putting the recommendations into effect, of their own accord."

J. F. C. H.

FRANCHINI (Giuseppe). **Rapporto sul funzionamento della scuola di patologia coloniale. Anno Scolastico 1928-1929.** [Report on the Work of the Tropical School, 1928-29.]—87 pp. With 60 figs., 4 maps & 2 plates. 1930. Bologna: Tipografia Paolo Neri.

This report on the work of the Tropical School of the University of Bologna during the year 1928-29 is divided into five parts. In the first is given a sketch of the course in tropical medicine and surgery and in the various special branches, protozoology, helminthology, entomology, etc., for the Diploma of Specialist in Colonial Medicine. This course extends over a longer period than those of the British schools, namely, November to the end of June, following which the examination takes place. There is also a shorter course of four to five months for missionaries and colonial nurses. Part II briefly enumerates the subjects which have been specially investigated during the year, but little in the way of detail is presented, presumably because these are published separately in different periodicals as listed in Part III. Subjects studied have been: (1) Undulant fever and Epizootic abortion; (2) The transmission of Leprosy to monkeys (*M. sinicus*); (3) Investigation into the prevalence of Amoebiasis in Bologna, and animal experiments in connexion with malarial parasites, entamoeba, leishmania and spirochaetes, and a study of intestinal flagellates, ciliates and helminths.

A list giving the number of routine examinations is appended. Several of the publications mentioned in Part III are those of Professor Franchini on the distribution of Ticks in the Italian Colonies. These have already received notice in the *Bulletin*.

Part IV consists of brief accounts of Tripolitania, Cyrenaica, Eritrea, Somali, and the Italian Aegean islands, with good reproductions of photographs illustrative of the country, the hospitals, some special cases and suchlike matters of interest. The publication terminates with a list of those who have obtained the Diploma since 1925. The School clearly does good work, not only in training men for service in the tropics, but in assisting those already practising there by examining material sent in and by keeping in touch with the Colonies; it maintains relations with other tropical institutions and is to be congratulated on a year of good work.

H. Harold Scott.

BEIHEFTE ZUM ARCHIV FÜR SCHIFFS- UND TROPEN-HYGIENE. 1929.
Vol. 33. No. 3. pp. 5-287 (89-371). With 35 text figs. & 1 plate.
**Verhandlungen der Deutschen Tropenmedizinischen Gesellschaft.
Neunte Tagung vom 12.-14. September 1929 zu Tübingen.**
[Proceedings of the 9th Meeting of the German Tropical Society
held at Tübingen, September 12-14, 1929.]

This Beiheft contains the proceedings of the 9th meeting of the German Tropical Society held in 1929 at Tübingen at the invitation of Professor OLPP of the Institut für ärztliche Mission. There were 87 participants. A short account of the meeting, two pages of revised laws, and a list of members with office-bearers is succeeded by 36 papers, most of which will be noticed in this *Bulletin* in their appropriate place. They concern malaria, leishmaniasis, yellow fever, trypanosomiasis, helminthiasis, amoebiasis, plague, climatic bubo, undulant fever and other subjects. The number is well produced, with stiff covers.

A. G. B.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES
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1930.

[No. 6

HELMINTHIASIS.

ABAZA. **Note on Parasitic Infection in Alexandria.**—*Jl. Egyptian Med. Assoc.* 1929. Oct. Vol. 12. No. 8. pp. 149-154.

Persons always resident in Alexandria and without symptoms suggesting parasitism were chosen to the number of 1,093. The method of examination is unstated. Apparently the urine was examined in these and schistosome eggs found in 182; 163 had urinary eggs of *S. haematobium* and 15 of *S. mansoni*. Stool specimens numbered 1,025 and showed infection as follows: *Ascaris* 386, *trichuris* 156, *H. nana* 101, *enterobius* 41, hookworms 38, *S. mansoni* 28, *S. haematobium* 1, *trichostrongylus* 6, *T. saginata* 5, *strongyloides* 1. Cases free from infection numbered 390, so that infection was detected in 64·4 per cent. of the population. *Planorbis boissyi*, *Bullinus contortus* and *B. dybouski*, all intermediate hosts of schistosomes, were present in the city. Schistosome and ascaris infections were commonest in pupils of private preliminary schools.

Clayton Lane.

ZSCHUCKE (C.) & NAJERA (L.). **Importancia del parasitismo intestinal en Fernando Poo.** [**The Importance of Intestinal Parasites in Fernando Po.**—*Medicina Paises Calidos.* Madrid. 1929. Nov. Vol. 2. No. 6. pp. 541-551. [18 refs.]

The authors examined the faeces of 328 patients by the Kofoid and Barber technique in the hospital of Santa Isabel. 310, or 94·51 per cent., contained ova of hookworm, 66·46 per cent. those of *trichuris*, and 55·18 per cent. *ascaris*; only two specimens contained no ova. Sixty-five, or 19·81 per cent., were single infections, 263, or 80·19 per cent., had more than one. No appreciable difference was detected between the indigenous inhabitants, those of Spanish Guinea, and those of the neighbouring colony of the Cameroon. The maximum number of hookworms found was 321, and the average among 63 persons treated was 56; *Necator* was much more numerous than *Ancylostoma*, in a proportion of 98·97 to 1·03 per cent. in this series and 98·5 to 1·5 in another of 247 sick. Nevertheless, it is stated infection is not severe enough to account for the high mortality; this is ascribed to trypano-

somiasis and, in consequence, it would be a grave mistake to relax efforts against the latter in favour of a campaign against the former. [There is no suggestion that they might both receive attention.] Counted by Stoll's method, modified so that 0.1 cc. was examined in place of 0.15 cc., it was found that every female hookworm recovered corresponded to 119 eggs per gram of faeces, or since the number of females and males were 447 and 149 respectively to 90 eggs for each worm.

H. Harold Scott.

ROBERTSON (Russell L.). **Notes from Garkida Hospital.**—*West African Med. Jl.* Lagos. 1929. Apr. Vol. 2. No. 4. pp. 183-184. With 1 chart.

Faecal examinations conducted on 175 hospital patients at Garkida, Nigeria, showed ova of *Schistosoma mansoni* in 54, of hookworms in 35, *Taenia saginata* onchospheres in 53 and Strongyloides larvae in 1. In 227 schoolboys about 12 years of age, schistosome ova were found in 87 (*S. haematobium* in 22 and *S. mansoni* in 68). Both species were found in the same urinary specimen once and in the same faecal specimen once. *Taenia saginata* onchospheres were found in 52, hookworm ova in 33 and ascaris once only. More than two species of intestinal parasites were found in 5 and the percentage of intestinal parasites was 67.8. The diagnostic technique is not mentioned.

C. L.

LE GAC. Parasitisme intestinal au Ouadaï (Tchad). [**Intestinal Parasitism in the Chad District.**]—*Ann. de Méd. et de Pharm. Colon.* 1928. Apr.-May-June. Vol. 26. No. 2. pp. 210-215.

On the basis of 2 smears per stool 66.45 per cent. of 2,512 persons were found infected with worms. Details are: *S. mansoni* 1.91, *T. saginata* 16, *H. nana* 0, ascaris 6, strongyloides 9.79. *Ancylostoma duodenale* is the most frequent intestinal parasite [figures not given], necator has not been found, trichuris is rare, enterobius has been found several times, multiple parasitism is frequent.

C. L.

ROSS (P.). **Some Observations on Malaria and Helminthiasis in the Central Kavirondo Reserve adjoining Kisumu.**—*Kenya & East African Med. Jl.* 1929. Feb. Vol. 5. No. 11. pp. 367-374.

Of 675 persons examined 282 were found infected as judged by the "fallible method of smear examination" of faeces. Ascaris eggs were found in 219, hookworm in 20 and trichuris in 21. *Taenia* onchospheres were seen in 58 and in one village in 15 per cent. of those examined. In another place 40 of 50 children examined were infected. Ova of *Schistosoma mansoni* and of *S. haematobium* and larvae of *Strongyloides stercoralis* were rarely seen.

C. L.

BRISCOE (R. C.). **Incidence of Helminths in Kitui District.**—*Kenya & East African Med. Jl.* 1929. Sept. Vol. 6. No. 6. pp. 175–176.

The diagnostic method is unstated. In-patients, examined apparently as a routine, numbered 528 in all, and 357 infections were found in them, namely *T. saginata* 163, ascaris 85, hookworm 71, enterobius 12, trichuris 11, *S. mansoni* 17, *H. nana* 3, strongyloides 4, *C. sinensis* 1, *T. solium* 1, *T. confusa* 3. Of the schistosome cases 8 had no symptoms.

C. L.

ADVIER (M.). Les helminthiases chez le Malgache en Emyrne. [**Helminths among Malagasies.**]—*Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 390–393.

This report has as its basis 4 to 8 weekly examinations each of at least four preparations, evidently smears. Of 600 persons examined 450 were parasitized. Percentages are : Ascaris 56, trichuris 41, hookworms 20, trichostrongylus 1 (that is six times), *Taenia saginata* eggs once only, although treatment for the worm is not infrequently demanded locally. Three cases had eggs of *Schistosoma mansoni*, 7 had eggs believed to belong to *Dicrocoelium lanceatum*. Quadruple infestation occurred twice ; triple 45 times, *Hymenolepis nana* being present in one case ; double 174 times.

C. L.

KOBAYASHI (Harujiro), CHIBA (Eiichi) & FURUYAMA (Toshio). **On the Incidence and Degree of Infestation with Hookworm and Trichostrongylus orientalis in Keijo (Seoul), Chosen.**—*Acta Med. in Keijo.* 1929. Vol. 12. No. 2. pp. 66–71. [5 refs.] [Parasit. Dept., Imperial Univ., Keijo.]

This paper summarizes work which has mostly appeared only in Japanese. Examination was by faecal smear and by culturing in powdered peat. One series of smear examinations on Korean soldiers illustrates [facts apt to be forgotten] the influence of the extent of faecal examination on the ascertained incidence of infection. Its salient points are tabulated here. Smears were made on six occasions on 185 men, and showed the following infections :—

	Ascaris.	Tri- churis.	Hook- worm.	<i>T.</i> <i>orienta-</i> <i>lis.</i>	<i>Taenia.</i>	<i>C.</i> <i>sinensis.</i>
Detected after 1 smear ...	147	168	83	19	6	6
Detected after 3 smears ...	149	177	111	28	12	8
Detected after 6 smears ...	149	179	129	41	18	18
Culture ...	—	—	134	50	—	—

Trichostrongylus is usually associated with hookworm infection, suggesting a common mode of infection. " Our culture method, the

powder peat method, seems to be convenient and economical ; still we lack a comparative study accurately carried out with other culture methods or egg enriching methods. We are now engaged in such a study."

C. L.

ISHIKAWA (S.). **On the Results of Repeated Faecal Examinations of Japanese and Chinese In-Patients of the Hospital, Manchuria Medical College, and Results of Examination of Faeces of Mongolians.**—*Jl. Oriental Med.* 1929. Nov. Vol. 11. No. 5. pp. 142-143. [Manchuria Med. College, Mukden.]

Stools of 316 Japanese and 308 Chinese were examined three times each " by the coating method and by Yaoita's precipitation technique." The percentages of infections found in Japanese and Chinese respectively were : *Ascaris* 36.7 and 49, *trichuris* 37 and 9.5, hookworms 10.1 and 6.8, *trichostrongylus* 3.1 and 2. There were single finds of *M. yokogawai*, *H. nana*, *T. saginata* (segments) and *enterobius*. In 234 Mongolians examined once only, the percentages of finds were : *Ascaris* 60.3 and *trichuris* 1.6. There were 11 cases of *taenia* found (segments 3, onchospheres 8) and 1 of *enterobius*.

C. L.

SUZUKI (S.). **Study of the Distribution of Human Parasites in the Agricultural Districts of Formosa and of the Relation of Infestation to Age, Sex, Occupation, and Topography.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1929. July. No. 292. [In Japanese. English summary pp. 33-34.]

Examination of 40,000 faecal specimens (technique unstated) places the district of Taichu with the highest infection rate in Formosa. For *ascaris* the percentage is 92.77, for hookworms ("*Ankylostoma duodenale*") 59.6. The guineaworm rate is 95.7, which, however, does not leave much room for the conclusion that it " preys much more upon the young between the ages of 5 and 15 than upon the aged," and that it preponderates in women. Hookworms specially infect persons between the ages of 15 and 20, and males more than females. *Ascaris* infects women more than men.

C. L.

CORT (W. W.), SCHAPIRO (Louis), RILEY (W. A.) & STOLL (N. R.). **A Study of the Influence of the Rainy Season on the Level of Helminth Infestations in a Panama Village.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 626-634. [10 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The method of examination was by 1/200 gm. of faeces in Stoll's caustic soda. The conclusions are as follows :—

" Series of egg counts were made in a village in Panama at the beginning, middle and end of the rainy season. There was no evidence of any increase of hookworm infestation over the seven months of the rainy season, suggesting that in this region there is no considerable loss of worms during the four months of the dry season. The *trichuris* level was also about the same for the three series of counts. There was, however, a very remarkable increase in the *ascaris* counts in the third examination as

compared with the first and second. This was especially evident in the worst 'ascaris families' where the conditions were evidently very favorable for the spread of this parasite. This suggests that there is a considerable fluctuation in the level of ascaris infestation during the year in a region with a dry season of any considerable duration."

C. L.

LABERNADIE (V.) & MARNEFFE (H.). Etude sur le parasitisme intestinal à Cayenne. [**Intestinal Parasitism at Cayenne.**—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 568-584. [11 refs.]]

These faecal examinations, apparently by smear, cover many thousand persons from 1914 to 1927. The three main intestinal parasites are ankylostomes, ascaris and trichuris. Hookworms in 1926-27 were found in 94 per cent. of convicts and 61 per cent. of the free population, while the corresponding figures for ascaris were 12 and 53, and for trichuris 32 and 82. In children, percentages of infection as between 1 and 15 years rise for hookworms from 0 to 26, and for trichuris from 14 to 35, whereas for ascaris they fall from 78 to 33. Strongyloides larvae, it is held, have formerly been identified when ankylostome larvae were concerned, these having hatched within a few hours of the passage of the stool. *S. mansoni* eggs were found 65 times, but on no occasion in one who had never left the country. Eggs of the strongylate type 100μ to 120μ long by 50μ to 80μ wide with 2 to 4 blastomeres are occasionally found [the suggestion made that they belong to *Heterodera radiculicola* can scarcely be correct]. Treatment following diagnosis is advised.

C. L.

FABRE (Henri J. A.). Sur le parasitisme intestinal à la Guadeloupe. [**Intestinal Parasitism in Guadeloupe.**—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 671-673. [Lab. of Hyg. & Bact., Pointe-à-Pitre, Guadeloupe.]]

Of 472 stools submitted to the Laboratory of Hygiene and Bacteriology at Pointe-à-Pitre because there was some gastro-intestinal trouble, parasitism was found in 271 (57.5 per cent.). Detailed percentages were: Trichuris 44.3, ascaris 27.4, *Schistosoma mansoni* 14.8, *Necator americanus* 5.5, *S. stercoralis* 4.2, threadworms 1.6, *Hymenolepis nana* 0.2. There were also "*Amoeba dysenteriae*" 1.8 and "*Amoeba coli*" 0.2.

C. L.

GAMBLE, Jr. (W. G.). **Intestinal Parasites in Eastern Carolina.**—*Jl. Amer. Med. Assoc.* 1929. May 4. Vol. 92. No. 18. pp. 1516-1518. [4 refs.]

Of 3,101 persons examined as a routine measure, 17.6 per cent. were infected with intestinal parasites. Of those examinations in which the technique is mentioned, a plain smear was used in about a third, a smear and a "brine method" in about two-thirds. Tables show the finds: (1) of ova (in which *E. histolytica* is included), and (2) of parasites which include *Strongyloides stercoralis* and *Giardia lamblia*. They were as follows: A. Whites: Hookworms 382 and 16, ascaris 21 and 19, enterobius 17 and 20, *T. saginata* 1 and 4, trichuris 2 and 0, *S. mansoni*

2 and 0; and also *E. histolytica* 2, myiasis 2, and strongyloides 3. B. Coloured persons: Hookworms 29 and 0, ascaris 21 and 1, enterobius 1 and 2, and also *G. lamblia* 2 and *E. histolytica* 1.

C. L.

KRJABIN (K. I.), SCHULZ (R. Ed.), SSERBINOFF (P. I.) & SMIRNOFF (G. G.). Ergebnisse der Expedition zur Erforschung der Helminthosen der Kohlengrubenarbeiter der Donjetzhöhenkette. (25. Helminthologische Expedition der U.d.S.S.R. 1925.) [**Helminth Infestations of Coal Miners, Donetz (Ukraine).**].—*Zent. f. Bakt.* I. Abt. Orig. 1929. June 28. Vol. 112. No. 6/8. pp. 454-458. [8 refs.]

The number of diagnostic examinations made was 7,490 on 7,234 persons. The technique is unstated. No case of ankylostomiasis was found and only one of strongyloides infection. Trichuris was found in 22.8 per cent. of coal mine workers, in 8.94 per cent. of members of their families, and in 15 per cent. of salt workers; in the last group were also found thread worms, *Hymenolepis nana* and *Dicrocoelium lanceatum*. In brick kiln workers ascaris infection was 24.6 per cent. There were also reported *Rhabditis donbass* and *Rh. schachtliella*, *Opisthorchis felincus*, *Fasciola hepatica*, *Taenia saginata*. Investigations were also carried out on animals.

C. L.

PLOTNIKOV (N. N.) & SERTSCHANINOV (L. K.). Zur Frage der Verbreitung der Eingeweidewürmer unter den Kindern der Stadt Swerdlowsk und Blutveränderungen bei diesen Infektionen. [**Intestinal Worms among Children of Swerdlowsk (P Government of Saratov).**].—*Rev. Microbiol., Epidemiol. et Parasit.* 1929. Vol. 8. No. 2. pp. 160-168. [19 refs.] [In Russian. German summary p. 226.]

These children, who were examined two or three times, numbered 245 and were from 6 to 12 years of age. Percentages found infected were: Enterobius, 33.8; ascaris, 18.3; trichuris, 10.6; trichostrongylus, 7.8; taenia, 7; *H. nana*, 2.5. Infection with worms lessened the number of monocytes, but was without influence on other blood corpuscles, red or white, except the eosinophils, which were increased often at the expense of neutrophils.

C. L.

DUBROWINSKI (S. B.), KRANZFELD (A. M.), ROSENFELD (W. D.) & SALAMANDRA (E. G.). Ueber die Verbreitung der parasitischen Würmer bei verschiedenen Bevölkerungsgruppen in Moskau und die Wege der medizinischen Helminthologie. [**Distribution of Parasitic Worms in Moscow.**].—*Zent. f. Bakt.* I. Abt. Orig. 1929. June 28. Vol. 112. No. 6/8. pp. 481-496. With 1 fig. [31 refs.]

In 2,879 persons the stool was examined by Fülleborn's Hamburg coverglass method, and in 757 the rectal mucus was obtained and examined, but in 576 of the latter both methods were used. The percentages of infection by the former were: Ascaris 30, trichuris 20, enterobius 14, and trichostrongylus 2. Ankylostomes were found 33 times in Turkomans and twice in Chinese. The percentages of cestodes were

H. nana 3, *Taenia* sp. 0·3, diphyllbothrium 0·1. The rectal mucus showed a 72 per cent. infection with enterobius, though it was in certain institutions 100. Infection increased the average amount of eosinophilia.

C. L.

VINOGRADOFF. Les invasions vermineuses parmi la population russe et samoyède de la Toundre Timanskaya du gouvernement d'Archangel. [**Worms found in Russians and Samoyedes in Archangel.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 5. pp. 329–331. [In Russian. French summary p. 332.]

In 334 Russians and Samoyedes whose faeces were examined at Toundre Timanskaya, Government of Archangel, *Diphyllbothrium latum* affected 74 per cent. of the former and 95 to 100 per cent. of the latter.

C. L.

- i. BLASCHIN (A.). Die Arbeiten der zweiten Helminthologischen Expedition des Abchasischen Instituts für Tropenkrankheiten. [**Results of Helminthological Expedition of Abkhasia Institute of Tropical Diseases.**]—*Nachrichten der Tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 5. pp. 352–360. [In Georgian script. German summary p. 412.]
- ii. MELADSE (K.). Die Arbeit der Helminthologischen Expedition des Abchasischen Instituts für trop. Erkrankungen im Kreis Gali—*Ibid.* pp. 361–366. [In Georgian script. German summary pp. 412–413.]

i. Examined by smears and Fülleborn's gravity floatation method, 450 persons from 3 villages in East Abkhasia showed an 86·5 per cent. worm infestation. Hookworms were carried by 50 to 73 per cent. of inhabitants, 71·2 per cent. of worms recovered being necators. The work proceeds.

ii. Of 759 persons examined (431 of them school children) by unstated means, hookworms were found in 70·2 per cent., ascaris in 36·3, trichuris in 30·1 and taenia in 4.

C. L.

SWANIDSE (D.). Ergebnisse der Untersuchung der Bevölkerung aus der Tifliser Vorstadt Ortatschala auf Darmparasiten. [**Examination of Persons from a Tiflis Suburb for Intestinal Parasites.**]—*Nachrichten der Tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 5. pp. 345–351. [In Georgian script. German summary p. 411.]

In this suburb of Tiflis 715 school children and gardeners were examined for intestinal parasites by a technique unnoted in the German summary. The infection percentages found were: Trichuris 86, ascaris 38, hookworms 14, enterobius 4, trichostrongylus 0·6, *H. nana* 11 (9 cases in gardeners and 27 in kindergartens), *T. saginata* 1, and for worm infections of any kind from "86 to 100." Ankylostomiasis is almost exclusively limited to incomers from West Georgia.

C. L.

GORDADSE (G.) & KAMALOW (N.). Zu der Frage der Darmwürmerinvasion bei der Eisenbahnbevölkerung der georgischen Teiles der transkauk. Eisenbahnen. [**Intestinal Worms in the Personnel of the Georgian Section of the Transcaucasian Railway.**]—*Nachrichten der Tropischen Medizin.* Tiflis. 1929. Feb. Vol. 2. No. 2. [In Georgian script. German summary p. 180.]

By Fülleborn's method, and by smears, 712 railway scholars were examined and evidence of worms found in 98 to 100 per cent. Threadworms, ascaris and trichuris were common; *Hymenolepis nana* infected

7 per cent. of Batum scholars. Other infections were strongyloides 1 case, trichostrongylus 2, toxascaris 1, dicrocoelium 4. Hookworm eggs were detected in 7.1 to 23.9 per cent. of cases.

C. L.

MACZKIEWIECZ (A.). Die helmintho-koprologischen Untersuchungen der Bewohner der Stadt Taschkent, durchgeführt auf der Malaria-station in Taschkent im 1926-27. [**Helminthological Examinations in Tashkent.**].—*Pensée Méd. d'Usbéquistan et de Turquemenistan.* Tashkent. 1929. Aug.-Sept. No. 11-12. pp. 69-74. [In Russian. German summary p. 126.]

By an unstated diagnostic technique 723 children in schools and children's homes were found parasitized to 23.4 per cent., and 478 in a "Wurmambulatorium" to 40 per cent. Trichuris was the most prevalent parasite (12.4 and 10.5 per cent. respectively) except for a 23 per cent. infection by *Taenia saginata* in the Ambulatorium. *Hymenolepis nana* parasitized 5 to 6 per cent., and there were found in both series *Dicrocoelium lanceatum* (1.2 and 2.9 per cent.) and *Fasciola hepatica* (2.8 and 1 per cent.).

C. L.

LÖRINCZ (Franz). Ueber die in Ungarn in Menschen vorkommenden Darmparasiten bzw. Parasiteneier. [**Intestinal Parasites found in Man in Hungary.**].—*Zent. f. Bakt.* 1. Abt. Orig. 1930. Feb. 3. Vol. 115. No. 5/6. pp. 372-377. [Royal Hungarian State Hyg. Inst., Budapest.]

Faeces of 1,567 persons, broken up in 1 per cent. formalin, were strained and the filtrate examined by covered smear, by Telemann's method and mixing with glycerine. There were found infected 657 (528 under and 129 over 15 years). Of these 136 had two or more infections. The number of times the various parasites were found was as follows: *H. nana* 33, *T. solium* 2, *T. saginata* 1, strongyloides 9, trichuris 563, hookworms 1, ascaris 133, enterobius 53. Details for age, sex, and habitat of the infected are given.

C. L.

CIPRIANI (P. F.). Ricerche di elmintologia intestinale nel Comune di Argenta. [**Intestinal Worms in Argenta (Ferrara Province).**].—*Arch. Ital. Sci. Med. Colon.* 1929. June 1. Vol. 10. No. 6. pp. 262-267. English summary p. 267.

Intestinal helminthiasis was present in 84 per cent. of about 300 cases examined. Apparently Telemann's method of concentration was used. Details are: Trichuris 244, ascaris 131, enterobius 3, strongyloides 1. Hookworm eggs were not found. Infection was commoner where houses were grouped than where they were single. Installation of sanitary latrines is advised.

C. L.

HERNANDEZ-PACHECO (Diego) & PASTOR BOTIJA (Felix). Informe sobre las helmintiasis endémicas en el delta del Ebro. [**Helminthiasis in the Ebro Delta.**].—*Medicina Países Cálidos.* Madrid. 1929. July. Vol. 2. No. 4. pp. 336-351. With 9 text figs. [5 refs.]

In this rice-growing district 325 persons were examined for ankylostomiasis (the method seems unstated) with the help of the antimalarial staff. None was found, though 47 cases of trichuris infection, 35 of ascaris, 4 of

hymenolepis and 2 of "distoma" infection were discovered. Nor is there reason to believe that hookworm infection has existed at any time in the Ebro delta.

C. L.

LOPEZ-NEYRA (Carlos Rodriguez) & TORRES LOPEZ (Antonio J.). Gusanos parasitos intestinales del hombre en España. [**Intestinal Parasites of Man in Spain.**—*Medicina Paisés Cálidos*. Madrid. 1928. Sept. Vol. 1. No. 5. pp. 411-427. [70 refs.]

This summarizes for Spanish readers the findings of parasitic worms in Spain for many years past.

C. L.

SANDGROUND (J. H.). **A Consideration of the Relation of Host-Specificity of Helminths and Other Metazoan Parasites to the Phenomena of Age Resistance and Acquired Immunity.**—*Parasitology*. 1929. Sept. Vol. 21. No. 3. pp. 227-255. [58 refs.] [Med. School, Harvard Univ., Boston.]

The author discusses the work of others on host restriction or specificity and age resistance and acquired immunity. Among many other points mentioned it may here be noted that the horse may have a short-lived infection with *Schistosoma japonicum* and is then immune. "Salmon-poisoning" in dogs (infection by *Nanophyes salminicola*, a small intestinal trematode) is very fatal. Some dogs survive and have a substantial immunity. The hosts of *T. solium*, *T. saginata* and *H. nana* resist superinfection, but not reinfection, and the host's age is a factor in this resistance. Rats fed with sublethal doses of trichinella withstand reinfection, larvae being arrested in growth and swept out of the intestine. Infections with hookworms, syngamus, and *Ascaridia lineata* are considered. The question of man and pig strains of *Ascaris lumbricoides* is discussed, and also *Ascaris vitulorum*, *Trichuris depressiusculus*, *Loa papionis*, *Strongyloides stercoralis*, and certain other metazoan parasites.

C. L.

TONKING (H. D.). **A Note on the Sub-Ungual Debris of the African Native.**—*Kenya & East African Med. Jl.* 1929. July. Vol. 6. No. 4. pp. 109-110.

Subungual debris was examined by scrapings from all digits, placed severally in a few drops of saline, faeces by D.C.F. for eggs and by simple suspension in saline for protozoal cysts. The examined were 50 prisoners already treated with carbon tetrachloride and oil of chenopodium. The findings of eggs were these:—

	Taenia.	Ascaris.	Hook-worm.	Trichuris.	Enterobius.
Nails	11	0	1	0	5
Faeces by D.C.F. ...	9	12	8	14	1

One macerated larva, identified as an ankylostome, was found under a nail and *E. coli* cysts in three stools.

C. L.

BOGOJAWLENSKI (N. A.) & LEWITZKI (R. G.). Wurmträger unter den zur Wehrpflicht Einberufenen nach den Ergebnissen perianaler Abschabung. [**Worm Incidence among Recruits as shown by Perianal Scraping.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Aug. Vol. 33. No. 8. pp. 413–416.

There were examined by perianal scraping on the one hand, and by investigation of the faeces by Fülleborn's and Telemann's methods on the other, 1,000 persons. The relative percentage findings were these: Enterobius 55·6 and 0·5, taenia 52·6 and 0·2, ascaris 11·2 and 45, trichuris 5·3 and 88, hookworms, dirocoelium, and *Fasciola hepatica* 0 and 0·1 each. In those parasitized by taeniae there was no evidence in weight or height of any detrimental action by the tapeworm.

C. L.

SCHACHMATOW (A. P.). Die Methode der Schleimentnahme aus der Ampulla recti zur Untersuchung auf Wurmeier. [**Withdrawal of Mucus from Rectal Ampulla in Examination for Worm Eggs.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. July. Vol. 32. No. 7. pp. 352–354. With 1 text fig. [1 ref.] [Lab. of Helminth Division, Tomsk.]

Believing that the rectal mucus is a natural extractor of helminthic eggs lying in the faeces, Schachmatow uses a solid-ended glass tube with two windows which collect mucus from the rectal wall. He records results of over 5,000 examinations in which there were discovered eggs in these percentages: Enterobius 63·8, ascaris 2·2, trichuris 1·6, strongylata 2, strongyloides (larvae) 0·2, taenia 17·8, diphyllbothrium 0·4, dipylidium 1, *Hymenolepis nana* 1, *H. diminuta* 0·2, opisthorchis 1·8. The methods of Telemann and Fülleborn have given no better results than these. [There seems to be no evidence in the literature of the real value of Telemann's method. Fülleborn found his own unsuccessful in the field.]

C. L.

KORTENHAUS (Friedrich). Verbesselter Nachweis von Wurmeiern im aufgehellten dicken Trockenkotsausstrich. [**Demonstration of Worm Eggs in a Cleared Thick Smear of Faeces.**]—*Muench. Med. Woch.* 1928. June 15. Vol. 75. No. 24. p. 1029. [8 refs.] [Hyg. Inst., Univ., Cologne.]

The following is the routine advised in this paper for this frequently suggested means of using a thick preparation, on the mistaken analogy of Ross's thick film method for malarial diagnosis [see this *Bulletin*, Vol. 24, p. 978]. Rub faeces up in 10 per cent. acetic acid; spread in a thick film; dry in the air; add cedar oil and a cover. It is noted, as usual, that ascaris and trichuris eggs stand out well. No figures show its value for colourless eggs.

C. L.

RUKHADZE & BLAJIN. On a Method for staining Flukes and Tapeworm Segments as Whole Microscopical Preparations.—*Jl. Trop. Med. & Hyg.* 1929. Dec. 2. Vol. 32. No. 23. pp. 342–343. With 4 text figs.

Unfixed small trematodes and cestodes are stained for 30 to 60 minutes in a 30 per cent. lactic acid solution in which 0·3 per cent. of carmine has

been dissolved at the boiling point; staining is checked by the microscope. Wash then in running water till purple; dehydrate as usual in alcohol and bring into Canada balsam. For large cestodes macerate in water for 3 to 4 days (in summer not more than 24 hours); stain for 4 to 6 hours; wash; immerse for 16 to 20 hours in iron-carbolic (liq. ferri sesquichlor. 3 drops, carbolic acid 1 per cent. 2 drops, water 100 cc.); wash; straighten on a slide; dry at 30° C. to 37° C.; mount in Canada balsam, or in resin dissolved in a mixture of chloroform and absolute alcohol or carbon disulphide.

C. L.

SANKIN (S. L.). Zur Methodik der Herstellung haltbarer Dauerpräparate von Eiern parasitischer Würmer. [**Production of Permanent Preparations of Ova of Parasitic Worms.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Aug. Vol. 33. No. 8. pp. 416-417. [Trop. Inst., Moscow.]

The faeces are worked up with a Telemann solution containing only 50 per cent. of hydrochloric acid, a concentrated solution deforming eggs. Of the following 10 cc. is added:—

Formalin 40 per cent.	...	...	...	3
Common salt	...	...	...	0.85
Distilled water	...	...	...	100

The whole is centrifuged for a minute. The supernatant fluid is poured off, the precipitate washed with more of the formalin solution and precipitated again by the centrifuge. A drop of the sediment is placed on a clean slide, covered with a clean cover glass, and ringed with Canada balsam preferably liquefied by heat and not by xylol. Such preparations are claimed to keep well for months or years, and to show up well the eggs of nematodes, cestodes and trematodes

C. L.

HOEPLI (R.). Histologische Beiträge zur Biologie der Helminthen. [**Biology of Helminths.**]—*Virchows Arch. f. Path. Anat.* 1929. Feb. 27. Vol. 271. No. 2. pp. 356-365. With 4 text figs. [7 refs.] [Amoy Univ., China.]

In the small intestine of a hen infected with a *Davainea*, microscopic sections showed that the epithelium had been locally destroyed, the scolex being attached direct to the interstitial tissue of the mucosa whose fibres the figure shows as stretched out towards it. In the intestine of a dog the scolex of *Dipylidium caninum* had equally produced denudation and had sunk almost as far as the muscularis mucosae. *Dirofilaria immitis* in the lung of the dog showed haemorrhagic infarction and its subsequent organization into fibrous tissue.

C. L.

BUCKLEY (J. J. C.) & CLAPHAM (Phyllis A.). **The Invasion of Helminth Eggs by Chytridiacean Fungi.**—*Jl. Helminthology.* 1929. Mar. Vol. 7. No. 1. pp. 1-14. With 21 text figs. & 8 figs. on 1 plate. [7 refs.]

The chytridiacean fungi *Catenaria anguillulae*, Sorokin 1876, and *Rhizophidium carpophilum*, Zoff, were found parasitizing eggs of *Dibothriocephalus latus*, and experiments were carried out with a view to the possibility of utilizing these fungi for destroying helminth eggs in septic tanks. In this strain of *C. anguillulae* the formation of resting spores was observed, and such spores are resistant to desiccation and may remain quiescent for periods of two months or more.

Both parasites also infect eggs of *D. mansonii*, *Fasciola hepatica*, and of *Parascaris equium* under laboratory conditions; but the presence of sewage in the medium greatly inhibits development and infection. *C. anguillulæ* can develop under nearly anaerobic conditions in water, but not in the presence of sewage; while *Rh. carpophilum* does not develop anaerobically under either condition. Sporangia of *C. anguillulæ* are stimulated to spore formation by short desiccation, up to about 24 hours, but are killed by desiccation for more than 120 hours. A temperature of 4° C. to 8° C. for a week kills this parasite; while a temperature of 37° C. is favourable and hastens its development.

P. Tate.

SÉMENOFF (G). Sur quelques particularités biologiques dans l'helminthiase humaine. [**Biological Data in Human Helminthiasis.**]—*Acta Univ. Asiae Medicae*. Tashkent. Ser. 9. Med. 1928. No. 9. pp. 1-5. [21 refs.] [In Russian. French summary p. 6.]

A summary of established work.

C. L.

PESSÔA (Samuel B.). Notas sobre vermifugos. I. O cão como animal de escolha para o estudo experimental dos vermifugos. [**The Dog in the Experimental Study of Vermifuges.**]—*Brasil-Medico*. 1928. Aug. 11. Vol. 42. No. 32. pp. 899-900. [3 refs.] [Hyg. Inst., S. Paulo.]

The effectiveness of certain anthelmintics has been tested on a few dogs. The more important of the figures thus collected are tabulated here, dosage being in cubic centimetres [and the corresponding dosage for a man being added for easy comparison]. Tannin was tried and had no vermifugal action.

	Dose per kilo.	Hook- worms expelled.	Hook- worms not expelled.	Dose for a man of 60 kilos.
Ascaridole ... {	0.05	7	0	3
	0.08	22	0	4.8
	1.00	0	14	60
Carbon tetrachloride {	0.05	0	14	3
	0.50	10	0	30
	0.60	3	0	36
	0.20 [sic]	2	0	12
	1.50	7	0	90

C. L.

PESSÔA (Samuel B.). Notas sobre vermifugos. [**On Vermifuges.**]—*Brasil-Medico*. 1929. Dec. 21. Vol. 43. No. 51. pp. 1567-1569.

The author tested the anthelmintic action of certain plants on dogs harbouring *Ancylostoma caninum*. Various species of *Combretum* are

found in Brazil. He used an aqueous extract of *C. quadrangularis* obtained from the Wellcome laboratories, but found that up to 1.5 cc. per kilo bodyweight it was ineffectual. It enjoys considerable reputation locally. The essential oil of *Tagetes minutus* up to 0.3 cc. per kilo, also the extract of pyrethrum and the essential oil of *Kyllinga odorata*, 0.4 cc. per kilo, had neither of them any anthelmintic effect. *Ficus anthelmintica* was useless for *A. caninum* but effective for *Trichocephalus* in dogs, and it is suggested that further trial should be made of this for human infestations.

H. Harold Scott.

ADVIER (M.). Note sur deux anthelminthiques malgaches. [**Two Madagascan Anthelmintics.**]*—Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 388-390.

The kernels, raw or lightly roasted, of "voatamenaka" or "tamenaka" (no scientific name is added) are given for ascaris infection at the rate of two kernels for each year of age, with 20 for an adult, taken with castor oil, fasting in the morning. Although HECKEL advised against larger quantities than 6 or 7 kernels as likely to produce nerve symptoms, Advier states that the drug has the advantage that it may be given without fear of poisoning to children of 4 to 6 months, who even at that age may be heavily parasitized.

A handful of the leaves and stems of "taimborontisloza" (*Chenopodium ambrosioides* according to HECKEL) is bruised and the juice taken by the natives without much regard to quantity; although the name signifies "turkey's dung," to Advier it recalls absinth. It is apt to cause vertigo, headache, vomiting, and even death. The suggested dose is 15 gm. of the fresh or 5 gm. of the dried plant as an infusion. It is particularly advised, in place of thymol, when there is co-existing malaria.

C. L.

MACIEL (Heraldo). O tetrachloreto de carbono e o tratamento das helmintososes. [**Carbon Tetrachloride in the Treatment of Helminth Infestations.**]*—Sciencia Med.* 1929. July. Vol. 7. No. 7. pp. 346-352.

Carbon tetrachloride was given in the slowly melting jelly form with the proprietary name of neonecatorina in doses of 3.5 gm. to 120 cases. When given in the early morning nausea was present in 7 of 50; an hour before food in 8 of 25, with some headache, vomiting and palpitation; at the same time as food in 9 of 15, with headache or vomiting in 4 more; when given an hour after food nausea was present in 15 of 30, while 10 more had vomiting or headache. Only 1 of 12 constipated persons had nausea. Moreover, the drug is stated to have been given to 8 persons suffering from hepatic insufficiency, of whom 2 experienced nausea and 1 nausea and giddiness. In the same dose it is claimed that it disinfested 26 of 30 cases of ankylostomiasis, though the method of diagnostic examination seems nowhere to be stated.

C. L.

ROBBINS (B. H.). **The Absorption, Distribution and Excretion of Carbon Tetrachloride in Dogs under Various Conditions.**—*Jl. Pharm. & Experim. Therap.* 1929. Oct. Vol. 37. No. 2. pp. 203-216. With 1 fig. [10 refs.] [School of Med., Vanderbilt Univ., Nashville, Tenn.]

The following conclusions are reached :—

"Carbon tetrachloride is absorbed quite readily from the intestinal tract. . . . In the dog there is little if any absorbed from the stomach. Considerable absorption from the intestine and less from the colon. The amount absorbed increases with the dose [but far from in proportion]. . . .

"The rate of absorption is increased by both alcohol and fat. The increased rate with alcohol is thought not to be the cause of the severe toxic action seen when these two substances are given together. When fat is given together with carbon tetrachloride it has been shown that the carbon tetrachloride is carried up the thoracic duct in high concentration thus reaching the general circulation without passing through the liver, and produces nervous symptoms.

"When carbon tetrachloride is absorbed from the intestinal tract it is found in high concentration in the portal blood; the amount in arterial blood (carotid) was too small to quantitate. It is found in high concentration in the liver, with the highest concentration in the bone marrow. The concentration in the liver, pancreas, brain, etc. is about the same, being about one-fifth that found in the bone marrow.

"Approximately all of the carbon tetrachloride that is absorbed is excreted by the lungs. There is no excretion of carbon tetrachloride by the kidneys."

C. L.

LOPES (Renato Souza). A medicação vermífuga atóxica. [**A Non-toxic Vermifuge.**—*Folha Med.* 1929. Nov. 25. Vol. 10. No. 33. pp. 407-408.

To obviate the poisonous effects which sometimes follow the use of oil of chenopodium the author proposes to give it absorbed in kaolin and combined with scammony and phenol-phthalein. He maintains that the first, by preventing absorption, removes the possibility of toxic effects, while the scammony and the phenol-phthalein act as purgatives on the small and large intestine respectively. He gives the combined preparation in gelatin capsules.

H. Harold Scott.

LABERNADIE (V.). Le stovarsol comme vermifuge. [**Stovarsol as Vermifuge.**—*Rev. Méd. et Hyg. Trop.* 1929. Nov.-Dec. Vol. 21. No. 6. p. 188. [1 ref.] [Colonial Hosp., Pondicherry.]

Referring to an article by PORRIN and noting that in the experience of colonial medical officers it is not rare for helminths to be expelled when stovarsol is being given for dysentery, Labernadie cites a boy of 12 in hospital at Pondicherry for fever which shortly left him. The stools contained many ascaris eggs, and 2 stovarsol tablets were given daily for 2 weeks. Ascarids were passed, 1 to 3 daily, and 5 days after the end of the treatment no eggs could be detected. In Guiana he had found that 4 tablets daily relieved the itching of threadworms and that these then ceased to be found.

C. L.

RICO (J. Toscano). Efficacité anti-helminthique du géraniole. [**Geraniol as an Anthelmintic.**].—*C.R. Soc. Biol.* 1929. Oct. 18. Vol. 102. No. 26. pp. 218-220. [3 refs.]

Geraniol in doses of 0.3 cc. per kgm. body weight of dogs, castor oil, and one or two drops of croton oil was found 100 per cent. effective against *Uncinaria stenocephala*, the drug being checked by killing the dogs. Doses of 5 cc. have produced no ill-effects.

C. L.

VON QUERNER (Friedrich R.). Zur Histologie des Exkretionsgefäßsystems digenetischer Trematoden. I. Teil. [**Histology of the Excretory Vascular System of Digenetic Trematodes.**].—*Ztschr. f. Parasitenk.* 1929. Mar. 26. Vol. 1. No. 4/5. pp. 489-561. With 32 text figs. [Numerous refs.] [Zool. Inst., Univ., Vienna.]

There are described the topography and histology of the excretory systems of *Fasciola hepatica*, *Fasciola gigantica*, *Dicrocoelium lanceatum*, *Sterrhurus fusiformis*, *Paryphostomum radiatum*, and *Aspidogaster conchicola*. The excretory systems are divided for classification into those in which the terminal part is histologically undifferentiated, those in which it is merely dilated into an excretory vesicle, and those in which this is associated with muscle. For the rest it is shown that *Fasciola* has a network of excretory vessels and other flukes, such as *Fasciolopsis*, a system of non-anastomizing tubes. *D. lanceatum* has 10 secretory organs in each lateral half.

C. L.

ROSS (I. Clunies) & MCKAY (A. C.). **The Development of *Fasciola hepatica* L. in the Final Host.**—*Australian Vet. Jl.* 1929. Mar. Vol. 5. No. 1. pp. 17-23. With 3 text figs. [6 refs.]

In order to throw more light on whether immature *Fasciola hepatica* reach the liver via the peritoneal cavity or the portal vein, cercariae were fed to guineapigs and rabbits. In a guineapig, five days after feeding with 35 cercariae, 12 burrows mostly under 5 mm. long lead down into the liver from its surface and no cercariae could be collected from the peritoneal cavity. At later dates burrows were longer and wider. In one rabbit "several of the burrows came so near to the surface that the capsule was ruptured in various places and through such ruptures blood was oozing." This conclusion implies that this route is the normal one for sheep [but the described lesions suggest that the larvae were wandering in an unnatural medium]. It is held confirmed by appearances found in apparently early natural infections in sheep.

C. L.

KELLAWAY (Charles H.). **Anaphylactic Experiments with Extracts of Liver Fluke (*Fasciola hepatica*).**—*Australian Jl. Experim. Biol. & Med Sci.* 1928. Dec. 16. Vol. 5. Pt. 4. pp. 273-283. With 2 text figs. [13 refs.] [Walter & Eliza Hall Inst., Melbourne.]

In this important study Kellaway employed the method of Dale & Laidlaw on the isolated uterus of the virgin guineapig with the object of throwing fresh light on the nature of the substances in helminthic extracts which act as anaphylactic antigens. Guineapigs were sen-

sitized by injections given a few days after birth and both saline and alcoholic extracts of flukes of different strengths were employed. The flukes were well washed, completely dried and powdered before extraction. In all the experiments care was taken to free extracts from pharmacological activity by dialysis or pressure filtration, and to use them only in a dosage which had no stimulant effect on the normal uterus. Sensitiveness to ovine host protein was also tested.

In the first group of experiments saline extracts were used for both sensitization and testing, and TURNER's findings that guineapigs could be sensitized with these extracts were confirmed. The results, however, were not highly specific, for guineapigs sensitized with *Taenia saginata* and hydatid scolices showed cross reaction to fluke extracts. When saline extracts were used to sensitize no response followed with the absolute alcoholic extract (99.9 per cent. ± 0.1 per cent.), but a maximal contraction ensued when the 60 per cent. extract was added to the bath. Extracts of intermediary strength (80 per cent.) gave irregular results. On the other hand, the injection of even the absolute alcoholic extract generally led to sensitization provided the uterus was tested with saline extract, a result of considerable interest, since the most delicate chemical tests for protein were negative in the former.

Kellaway concludes that two substances are concerned in these anaphylactic reactions. The first one is present in the saline extract and shows a decreasing solubility in increasing strengths of alcohol. It is a true anaphylactic antigen, but differs in nature from other proteins in its resistance to heat. The second, soluble in absolute alcohol, is capable of sensitizing guineapigs but not of discharging the sensitiveness of sensitive plain muscle. The latter substance is thought to be a lipin possibly identical with the antigen responsible for complement fixation.

A valuable discussion on the technique, the limitations and the difficulties of the anaphylactic method is included in this paper, which should be consulted in the original by those interested in the subject.

N. Hamilton Fairley.

HOFFMAN (William A.) & RIVERA (Trinita). **The Precipitin Test in *Fasciola hepatica* Infection.**—*Porto Rico Rev. of Public Health & Trop. Med.* 1929. June. Vol. 4. No. 12. pp. 589-598. [School of Trop. Med., Univ. of Porto Rico, San Juan.]

Hoffman & Rivera describe the results of an investigation into the value of the precipitin test in infestations with *F. hepatica*. Flukes which had been previously washed were dried and powdered and from this material four antigens were prepared from the non-soluble residues of Soxhlet extractions with ether, alcohol, ether-alcohol, and alcohol-ether. Coca's solution and physiological saline were both used as solvents, 5 mgm. to 2 cc. of liquid being the final quantities selected for the production of the undiluted antigen.

At the abattoirs the faeces and livers of all animals investigated were examined for ova and flukes respectively after specimens of heart blood had been obtained. In the final technique the authors employed 5 tubes to each test, 0.15 cc. being the quantity of serum utilized. Equal quantities of a 1:1, 1:10 and 1:100 dilution of antigen were added to the first 3 tubes. The remaining two served as antigen controls. Results were designated + + +, + +, and + according to

the intensity and thickness of the ring formed between the serum and antigen in the positive test. Readings were made after one and two hours at room temperature.

Post-mortem evidence of *F. hepatica* was found in 46 of 101 animals examined, and their sera all yielded positive reactions. In 39 other instances, however, positive serological results were observed where no parasitological evidence of fluke infestation was forthcoming. Possible explanations of this disparity are discussed [With 38.6 per cent of unexplained positive results the non-specific nature of the reaction needs critical consideration.]

N. Hamilton Fairley.

ISHII (S.). **Human and Dog Cases of *Fasciolopsis buski* in Canton, China.**—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1929. Mar. No. 288. [In Japanese. English summary p. 13.] [Haku-Ai-Kai Hosp., Amoy, China.]

"Examining the feces of 462 Chinese patients in the Haku-Ai-Kai Hospital at Canton, the author found eggs of *Fasciolopsis buski* in 7 patients (1.5 per cent.), and by the examination of 6 dogs he found the same eggs in 4 of them. From these figures he concludes that *F. buski* is not uncommon among the natives of Canton and that in this locality the dogs may be the definite hosts of this parasite "

C. L.

ANAZAWA (K.). **First Instance of *Echinostomum revolutum* found in Man and its Course of Infection.**—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1929. Mar. No. 288 [In Japanese. English summary pp. 10-13.] With 8 figs. on 1 plate & 1 text fig.

Echinostomid ova were found in the faeces of a woman, a native of and resident in Formosa. Male fern recovered from her 18 *Echinostoma revolutum* Froelich, 1802, a parasite of the duck. The worm is described and pictured. The local snail hosts have been determined by TSUCHIMUCHI and *Limnaca radix*, *L. pervia*, *Segmentina largillierti* and *Planorbis coenurus*, while Anazawa, noting that Formosans eat *Corbicula producta* raw and that they contained cysts which he identified as those of *E. revolutum*, and *Echinoparyphium koidzumii*, fed them to chickens, ducklings, mice and puppies previously examined as to the absence from their faeces of echinostomid ova, and produced both infections. The cysts possess considerable resistance to chemicals, to drying and to heat. *E. revolutum* having been found in man, a trematode in YOKOGAWA's possession, obtained from a patient by K. AKAGI in 1916, was re-examined by MORISHITA of the Central Research Institute of Formosa and identified as *Echinoparyphium koidzumii*. The paper, then, adds two to the list of occasional parasites of man.

C. L.

MAEDA (M.). Ueber die in den menschlichen Fäces enthaltenen unbekannten Parasiteneier und ihr Wesen. [**Unknown Parasite Ova found in Human Faeces: their Nature.**]—*Fukuoka-Ikwadaigaku-Zasshi* (*Fukuoka Acta Med.*) 1928. Aug. Vol. 21. No. 8. pp. 1690-1698. With 2 plates. [In Japanese. German summary pp. 82-83.]

Maeda had established that in spring and summer there were found in the faeces of certain persons curious trematode eggs. He noted that

those persons were fond of eating flying fish. In the gall bladder of this fish he found eggs similar to those found in man and also the fluke from which they came. The eggs are oval, yellowish brown, operculated as the figure shows, about 0.036 mm. long by 0.026 broad, and contain a miracidium with a collar of cilia. The adult trematode measured 9.5 by 4 mm. Neither abstract nor figure is very clear as to its internal anatomy. [The eggs, then, did not imply parasitism, but an undigested residue of food.]

C. L.

FELDMAN (William H.) & ESSEX (Hiram E.). Distomatose pulmonaire chez le chat. [**Pulmonary Distome Infection in a Cat.**—*Ann. Parasit. Humaine et Comparée*. 1929. May 1. Vol. 7. No. 3. pp. 204–208. With 7 figs. on 2 plates. [5 refs.]

What is claimed as the second reported case of pulmonary trematode infection in a cat in Minnesota is reported. The animal had been ill for about a year with cough, sometimes with greenish expectoration. In section of the lungs after death no flukes were found, but there were numerous eggs corresponding to *Paragonimus*. Their specific position is discussed.

C. L.

FAIRLEY (Keith D.) & FAIRLEY (N. Hamilton). **Bilharzia in Immigrants from Palestine.**—*Med. Jl. Australia*. 1929. Oct. 26. 16th Year. Vol. 2. No. 17. pp. 597–600. [21 refs.] [Walter & Eliza Hall Inst. of Research in Path. & Med., Melbourne.]

NELSON (1912) (this *Bulletin*, Vol. 1, p. 426) reported three cases of schistosomiasis in Western Australia, in two of which the infection was indigenous, so that some species of local mollusc must be capable of infection, though CHERRY has failed to infect some 300 local snails of the genera *Bullinus*, *Ancylus* and *Planorbis*. Four cases of vesical schistosomiasis are described from Australia in which infection was contracted about Jaffa in Palestine. In two there were eggs of *S. mansoni* as well as of *S. haematobium*. Only one had shown symptoms before reaching Australia. All were positive to the complement fixation reaction, the value of which as a means of early diagnosis during the long latent period is pointed out.

C. L.

RUBITSCHUNG (O.). Von der Bilharziosis in Palästina und der Behandlung mit Antimosan (661 Heyden). [**Schistosomiasis in Palestine and its Treatment by Antimosan.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Jan. Vol. 32. No. 1. pp. 32–37. With 2 text figs.]

Some cases of infection with *Schistosoma haematobium* are reported as acquired round Jaffa. While the conclusions state that *Melanopsis praemorsa* is established as intermediate host, the text appears only to say—in a footnote—that of snails sent to Hamburg for report and

falling into nine species, only *Unio* (*Limnium*) *tigridis* and *M. praemorsa* live in fresh water and that the former can probably be excluded. Antimosan is advised for treatment of children in preference to tartar emetic. At 2 to 3 days' intervals 2 to 8 cc. were given to boys of a 5 per cent. solution, with a total dose of 3 to 3.5 gm. of antimosan.

C. L.

CARROSSE & BARNÉOUD. Enquête sur la bilharziose vésicale à Marrakech (*Schistosoma haematobium*). [**Vesical Schistosomiasis at Marrakesh, Morocco.**]—*Arch. Inst. Pasteur d'Algérie*. 1929. Mar. Vol. 7. No. 1. pp. 51–78. With 8 plates & 2 text figs. [68 refs.] [Milit. Hosp., & Bureau of Hygiene, Marrakesh.]

The wide distribution of the intermediate hosts of *S. haematobium*, and the expense which would be involved in a local attack upon them, are shown. Periodical drying is not locally possible; the raising of ducks is encouraged. Copper sulphate has given constant results against snails in a dilution of 1 in 300,000. Propaganda is needed to combat the fatalistic creed of the natives.

C. L.

i. MACIEL (Heraldo). Sobre a frequencia da pseudodysenteria eschistosomotica na marinhagem brasileira. [**Bilharzial Dysentery among Brazilian Sailors.**]—*Sciencia Med.* 1929. Oct. Vol. 7. No. 10. pp. 512–513.

ii. —. Contribuição ao estudo da distribuição geographica da eschistosomose intestinal, no Brasil. [**The Geographical Distribution of *Schistosoma mansoni* in Brazil.**]—*Ibid.* pp. 514–516.

i. Patients treated for schistosomiasis in the Hospital Central de Marinha in the six years ending September 1929 number 1,130. Of these there have been 386 (34.1 per cent.) with symptoms of dysentery, 40 of a severe type, and 346 (30.6 per cent.) with mild diarrhoeic attacks, the faeces being streaked with blood.

ii. A second paper on the same subject stating that the infection is spreading with considerable rapidity and that fresh foci are being discovered; Nictheroy is a district recently found contaminated. *Planorbis olivaceus* and *Pl. guadeloupensis* are abundant on the north-east, *Pl. centrimetralis* in the central districts also.

H. Harold Scott.

ZAVATTARI (Edoardo). Malacofauna e schistosomiasi nel bacino del Mediterraneo. [**Molluscs and Schistosomiasis in the Mediterranean Basin.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Mar. 1. Vol. 10. No. 3. pp. 121–128. With 2 figs. [13 refs.] English summary p. 129. [Inst. of Comp. Anat. & Physiol., Univ., Pavia.]

Melania tuberculata is fairly abundant in Northern Africa, South of Morocco, Algeria, Tunis and in Egypt. Recently it has been found in Tripolitania and Cyrenaica. The closely allied *M. nodicincta* has been

shown by DYE to act as the intermediate host of *Schistosoma haematobium* and it is well within the bounds of possibility that the former may also be able to act as an intermediate host, and so introduce schistosomiasis into North Africa, Southern Italy and the neighbouring islands, which at present are free.

Various species of *Bullinus* also are found: *B. tropicus* in South Africa, *B. innesi* in Egypt and the Nile Basin, *B. dybowskyi* in Tunisia and Egypt, and *B. contortus*. The three last named are typical molluscs of the Mediterranean.

Planorbis metidjensis occurs in Algeria and Morocco, and *Pl. pfeifferi* and *Pl. boissyi* and *Pl. mareoticus* are present in parts of Africa.

The danger to Italy of all these intermediate hosts is obvious when infection is not far distant.

H. Harold Scott.

MEDULLA (Candido). Due casi di bilharziosi in Cirenaica. (Contributo alla casistica, alla nosogeografia ed alla terapia.) [**Two Cases of Schistosomiasis in Cyrenaica.**].—13 pp. [19 refs.] 1928. Benghazi. [Cyrenaica: Ospedale Coloniale di Bengasi.]

One of the patients was a native of Fezzan (Tripolitania), the other of Cyrenaica. They suffered from haematuria, and ova of *S. haematobium* were present in the urine. Treatment by bismucol being ineffectual, antimony was injected intravenously. The second ceased to pass ova after a treatment of 518 mgm. of "stibional," but in the first they persisted in spite of 69 cgm. of a 1 per cent solution antimony tartrate.

H. Harold Scott.

MENNONNA (Gerardo). La bilharziosi nell'alto Benadir. [**Schistosomiasis in Northern Benadir.**].—*Arch. Ital. Sci. Med. Colon.* 1929 Nov. 1. Vol 10 No 11. pp. 544-550. With 2 text figs. English summary p. 550.

A sketchy description of schistosomiasis in general and of *S. haematobium* in particular, stating that it exists in the northern Benadir district of Italian Somaliland. The author has not found the specific intermediate host among the molluscs he has examined.

H. Harold Scott.

PELTIER (M.). Contribution à l'étude de la prophylaxie antibilharzienne dans ses relations avec l'utilisation militaire des indigènes et l'essor économique de leurs colonies d'origine. [**Schistosome Prophylaxis in Relation to the Military Employment of Natives.**].—*Rev. Prat. Malad. des Pays Chauds.* 1929. June. Year 8. Vol. 9. No. 6. pp. 253-260, 263-265.

The paper is largely concerned with the possibility that schistosomiasis may become established in France, as the result of its introduction by infected African soldiers. No autochthonous case is known, though infected persons have entered France for more than 100 years, for many of Napoleon's soldiers came back from Egypt with haematuria. *Bullinus* sp. are present in Corsica, and BRUMPT has said that urinary bilharziasis could very readily be implanted about Porto-Vecchio in the south of that island.

C. L.

SCHEEPERS (Ivan K. M.). **Stopping the Spread of Bilharzia.**—*World's Health*. 1929. July–Sept. Vol. 10. No. 3. pp. 262–266. With 1 fig.

The enthusiasm of Mr. Duncan LINNEY, Inspector of Schools for the Rustenburg district, Transvaal, resulted in the setting up of a Christmas camp for the treatment by intravenous tartar emetic of children suffering from bilharziasis. Forty-nine were treated and 48 left with clear urine. The enthusiasm and devotion of those who voluntarily ran the camp and treatment clinic has aroused an increasing local interest, and the experiment is unlikely to end with this camp.

C. L.

PRICE (Emmett W.). **A Synopsis of the Trematode Family Schistosomidae with Descriptions of New Genera and Species.**—*Proc. U.S. Nat. Museum*. 1929. Vol. 75. Art. 18. 39 pp. With 15 plates. [5 pages of refs.]

Price divides the family into two subfamilies, Schistosominae with the male expanded into a gynaeophoric canal, and a new one, Bilharziellinae, in which the two sexes have similar forms. Within the former three new American species have been made types of three new genera, *Heterobilharzia*, *Microbilharzia* and *Paraschistosomatium*.

C. L.

MANSON-BAHR (Philip). **On Fairley's Intradermal Reaction in Schistosomiasis.**—*Jl. Helminthology*. 1929. June. Vol. 7. No. 2. pp. 99–100. With 1 plate. [1 ref.]

Two cases of infection with *S. haematobium* received respectively 22 grains and 21 grains of sodium antimony tartrate, given intravenously. Ova ceased to appear in each case after injection of 19 grains. Five days after the end of treatment an antigen prepared by FAIRLEY was injected intradermally. It consisted of dried powdered livers of *Planorbis exustus* infected with *S. spindalis* of the goat. Both cases showed a most marked reaction, beginning within 10 minutes of injection. "Fairley considers the test to be exclusively of diagnostic value and as not affording any index of the effect of drug treatment."

C. L.

BETTENCOURT (A.) & DA SILVA (E. Pereira). **The Cercaria of *Schistosoma haematobium*: with Reference to an Article of Blacklock and Thompson on Human Schistosomiasis in Sierra Leone.**—*Arquivos Inst. Bact. Camara Pestana*. 1928. Vol. 6. No. 1. pp. 1–21. With 11 text figs. & 1 plate. [23 refs.] [Camara Pestana Inst., Lisbon.]

This paper criticizes one by BLACKLOCK and THOMPSON (this *Bulletin*, Vol. 21, p. 940) on the anatomy of the cercaria of *S. haematobium*. The essential matters in disagreement are these. Bettencourt's cercariae are shorter than those described by BLACKLOCK and THOMPSON, a point on which stress is not laid since the methods employed for killing were different; the English authors saw no ciliated areas in the collecting tubes. But the main points of difference lie in the cephalic glands. Bettencourt and da Silva (*loc. cit.*, Vol. 20, p. 218) saw only

three pairs of glands, all of the same type, a point on which they were upheld by FAUST (Vol. 17, pp. 55, 58) and MANSON-BAHR and FAIRLEY (Vol. 16, p. 131). BLACKLOCK and THOMPSON, however, describe five pairs, three fine-grained and two coarse-grained. The accuracy of the observations by the two sets of observers is unquestioned. Which set was describing *S. haematobium*? Bettencourt is "absolutely convinced" that he was, since his snails came from a single pond from which animals were excluded, but which was "infested" by washerwomen, 70 per cent. of whom harboured *S. haematobium* and who had the unpleasant habit of passing urine in the pond in which they did their washing. All the hundreds of cercariae obtained from *Planorbis metidjensis* living in this pond were of the same type and produced in mice typical adult *S. haematobium*.

C. L.

PLAUT (Alfred) & VOGEL (H.). **The Differentiation of *Schistosoma hematobium* and *Schistosoma mansoni* according to the Position of the Spine.**—*Arch. Pathology*. 1928. Nov. Vol. 6. No. 5. p. 871. [1 ref.]

Plaut (1927) reported that he had found schistosome eggs with polar spine in the appendix of a woman in whose urine lateral spined ova were present, and concluded that "the position of the spine, whether polar or lateral, does not allow the differentiation of the two kinds of *Schistosoma*." FÜLLEBORN in a letter to Plaut claimed that, in sections, lateral spines might appear as if they were polar in position. Accordingly paraffin blocks containing bits of appendix and uterus were forwarded to Hamburg. After removal of paraffin and isolation of the eggs by solution of the tissues, all the 151 ova isolated from the appendix showed a lateral spine. "To determine whether spines in eggs of *Bilharzia* are polar or ventral, observations must be made on isolated eggs and not on sections of tissue."

C. L.

- i. KHOURI (J.). Deux cas de bilharziose vésicale avec présence simultanée dans les urines d'oeufs à éperon polaire et à éperon latéral. [**Vesical Schistosomiasis with both Terminal and Lateral-spined Ova in the Urine.**]—*Bull. Soc. Path. Exot.* 1928. Nov. 14. Vol. 21. No. 9. p. 771. [2 refs.]
- ii. —. Sur un cas rare d'infestation intestinale simultanée par *Schistosomum mansoni* et par *Sch. haematobium*. [**Case of Intestinal Infestation with *S. mansoni* and *S. haematobium*.**]—*Ibid.* p. 772. [1 ref.]
- iii. LEGER (Marcel). A propos de la localisation aberrante de *Schistosomum haematobium* et de *Schistosomum mansoni*.—*Ibid.* pp. 773–774. [2 refs.]

Leger comments on i and ii, whose titles explain their contents, and cites the literature and 19 personal observations on men showing schistosome eggs in their stools. Six of them harboured *S. haematobium*. He notes that the eggs of *S. mansoni* are more rarely found in the urine than those of *S. haematobium* in the faeces.

C. L.

RAYNAL (Jean). Sur les localisations aberrantes des schistosomes chez l'homme. [**Aberrant Localizations for Schistosomes in Man.**].—*Rev. Méd. et Hyg. Trop.* 1929. July-Aug. Vol. 21. No. 4. pp. 115–122. [29 refs.]

The following are anomalous findings taken from the literature.
i. Eggs of *S. haematobium* appeared in the stools, (a) alone, (b) in conjunction with those of *S. mansoni*, (c) in the urine as well. ii. Eggs of *S. mansoni* were found in the urine. iii. Eggs of *S. mansoni* were found in the urine and of *S. haematobium* in the stools.

C. L.

CHRISTENSON (Reed O.) & GREENE (W. P.). **Studies on Biological and Medical Aspects of "Swimmer's" Itch. Schistosome Dermatitis in Minnesota.**—*Minnesota Med.* St. Paul 1928. Sept. Vol. 11. No. 9. pp. 573–575. With 3 text figs. [3 refs.]

CORT noted in Michigan (this *Bulletin*, Vol. 25, p. 946) that the entry of *Cercaria elvae* usually produced a skin eruption. For a number of years there has been reported from several lake regions in Minnesota a peculiar type of follicular dermatitis locally known as swimmer's itch. Investigation showed three types of furcocercous cercariae emerging from local snails, one being *C. elvae* and its host being *Lymnaea stagnalis opressa*. Application to the skin of water containing these cercariae produced the typical follicular dermatitis; liberal application of the same water free from cercariae produced none. The lesions surround hair follicles.

C. L.

TSYKALAS & RIEGL (R.). L'émétine et la papavérine contre les affections bilharziques. [**Emetine and Papaverine in the Treatment of Schistosomiasis.**].—*Rev. Méd. et Hyg. Trop.* 1929. Sept.–Oct. Vol. 21. No. 5. pp. 137–157. [32 refs.]

The effects of papaverine are under investigation. Emetine is given in daily doses of not more than 0.1 gram, the total not exceeding 1 gram. With this treatment, as the authors note, FAIRLEY recorded 100 per cent. of cures; their own were 90.5 per cent. With tartar emetic the corresponding figures are 85 and 60. With 60 per cent. of cures with tartar emetic they had 4 per cent. of deaths, and when this drug was combined with emetine 80 per cent. of cures and a 6.15 per cent. mortality. The number of cases treated does not appear to be stated.

C. L.

PELTIER (M.) & RAYNAL (J.). Le chlorhydrate d'émétine en injections sous-cutanées dans le traitement des bilharzioses vésicales et intestinales. [**Emetine Hydrochloride subcutaneously in the Treatment of Vesical and Intestinal Schistosomiasis.**].—*Bull. Soc. Path. Exot.* 1929. Mar. 13. Vol. 22. No. 3. pp. 168–173. [2 refs.]

Some "incidents" having followed intravenous administration of emetine, the authors have given it subcutaneously to about 50 persons having vesical infections with *S. haematobium*. The general dose,

tentatively begun, is 0.1 gram daily for about 10 days. In 28 of them the period after treatment sufficed for fair comment. Nineteen left hospital cured. Relapses occurred in 6. In rectal infection with *S. mansoni* the detection of eggs is difficult and results less certain, but of 26 cases 23 passed from observation negative to ova, and 3 were lost to sight. It is therefore held with BOUILLIEZ that *S. mansoni* is more susceptible to emetine than *S. haematobium*.

C. L.

KHALIL (M.) & BETACHE (M. H.). **Treatment of Bilharziasis with a New Compound "Fouadin." Report on 2041 Cases.**—*Lancet*. 1930. Feb. 1. pp. 234–235. With 1 text fig. [2 refs.]

The authors report on 2,041 cases of schistosomiasis treated by intramuscular injection with fouadin, a trivalent organic antimony compound containing 0.0055 gm. of antimony in 1 cc. There was one death from sudden collapse on the day following the termination of treatment, which consists of 9 injections rising from 1.5 cc. to 5 cc. at the third injection and continuing at that level till the ninth or the fifteenth day. If these have not produced "cure," more are given. Cure after nine injections occurred in 44.3 per cent., after ten in an added 13.4, after eleven in an added 2.1 per cent., and after more than eleven in 0.5. Uncured were 44 or 2.1 per cent., while 669 or 32.8 per cent. did not complete treatment and 241 or 10.5 per cent. refused it. No inflammatory changes were noted after injection; the treatment was shortened compared to that with tartar emetic. It did not need skilled administration. On a large scale a syringe with a two-way and a reservoir allow for mass work, the needles being boiled between injections.

C. L.

WALKER (J.). L'application du tartre émétique par voies différentes dans la thérapeutique de la bilharziose. [**Treatment of Schistosomiasis by Tartar Emetic variously given.**]—*Ann. Soc. Belge de Méd. Trop.* 1928. Dec. Vol. 8. No. 3. pp. 273–289.

One hundred and forty-four cases were treated, with eight deaths; the main details appear in the table.

	Cases.	Cured.	Un-cured.	Treat-ment stopped.	Died.
Intravenous injection ...	36	27	3	3	3
Tablets orally in intestinal infection ...	80	67	6	6	1
Tablets orally in urinary infection ...	7	4	3	—	—
Rectal injections ...	15	8	2	—	2

Intravenous injection was with doses of 0.04 gm. to 0.1 gm., with an average total of 1.2 gm. Oral tablets contained 0.015 gm. of tartar

emetic with albumen from yeast, 6 to 8 being ordinarily given daily, with an average dose of 1.8 gm. ; in ten cases emetine had to be added but two died. Rectal injections each contained 0.5 gm. of tartar emetic in 10 per cent. solution, repeated 10 to 15 times. It would seem then that oral administration gave the most cures and the fewest deaths, though the author's conclusions are that intravenous injection gives the most constant results. Oral treatment provokes vomiting, but is specially advised for the weak. Intestinal injections are held to give a very rapid local result. After a full treatment, there is held to be little tendency to recurrence, even although the habitat is unchanged. Eosinophilia often appeared only during treatment, but was present to 20 per cent. in 6 of 9 patients who harboured *Filaria perstans*.

C. L.

CAWSTON (F. G.). **A Consideration of the Doses and the Solution used in the Treatment of Schistosomiasis.**—*Jl. Trop. Med. & Hyg.* 1930. Jan. 1. Vol. 33. No. 1. pp. 7-8.

Dosage of antimony corresponding to age and severity of infection is preferred to that corresponding to the patient's weight, experience teaching that those with a heavy infection tolerate unusually heavy dosage. Alcohol induces intolerance. Indian children, in spite of their small size, tolerate dosage corresponding to their age. Glucose is held not materially to lessen the toxic effects of tartar emetic, which are very slight when a pure drug is used.

C. L.

SMYRNIOTIS (P. C.). Calcification bilharzique des vésicules séminales décélée radiologiquement chez un sujet qui est infecté par la bilharzia mixte (termino et latéro-spinale). Avec présentation des radiographies et de la préparation microscopique. [**Calcification of Seminal Vesicles in a Patient with Mixed Schistosomiasis.**]—*Jl. Egyptian Med. Assoc.* 1929. Dec. Vol. 12. No. 10. pp. 231-235. With 3 plates (2 folding).

X-rays showed in this case an irregular bladder with " pseudodiverticula " about the base, and with calcification of the vesiculae seminales and of the apex of the bladder. Scraps of tissue passed in the urine were identified as probably sarcomatous.

C. L.

CERQUA (Saverio). Prostata-Zyste durch Bilharzia verursacht. [**Cysts in Prostate caused by Schistosoma.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Jan. Vol. 34. No. 1. pp. 58-61. With 3 text figs. [6 refs.] [Umberto I Italian Hosp., Cairo.]

A case is recorded where infection with *Schistosoma haematobium* was apparently limited to the prostate. A man of 40 complained of frequency of micturition, scalding and erection. The bladder sound showed nothing, rectal examination a painless elastic swelling in the left prostatic lobe. Prostatic massage produced no secretion. Excision of part of the cyst wall (enucleation having failed) showed eggs of *S. haematobium* between its fibrous layers.

C. L.

GIRGES (Rameses). **Schistosomiasis Mansoni**.—*Lancet*. 1929. Apr. 20. pp. 816-819.

— **The Clinical Aspect of Schistosomiasis**.—*Jl. Trop. Med. & Hyg.* 1929. Oct. 1. Vol. 32. No. 19. pp. 269-284. With 12 charts & 18 figs. in text.

Observation of over 4,000 cases of infection with *Schistosoma mansoni* at Tanta on the Nile delta, the centre of the largest endemic area of bilharziasis in the world, has led Girges to divide the disease into two types, intestinal and hepatic.

The intestinal type is considered under four stages following an incubation period. The first, febrile or toxæmic, seen in 3 per cent. of patients, begins three to five weeks after the "Baoonah itch" which marks cercarial invasion as an acute or insidious febrile attack, with invariable enlargement of liver and spleen, and occasional appearance of wheals and nephritis, and more frequently indigestion, diarrhoea and tenderness over the gall bladder. There is chlorotic anaemia, leucocytosis, and a 30 to 70 per cent. eosinophilia. It lasts three to six weeks. The second, dysenteric, begins with the appearance of ova in the stools, was seen in 58 per cent. of the series, lasts two and a half to three years, and shows dysenteric exacerbations every 15 to 20 days, with much fever. The mucous membrane as seen by the sigmoidoscope is deeply congested and velvety, with a dense covering of mucus, but no papillae. When these appear the third stage has been reached which comprised 32.5 per cent. of cases seen; the lower bowel is thickened and palpable through the abdominal wall, and the eosinophilia becomes slight. In the fourth stage, of repair, seen in 0.2 per cent. of cases, there is sclerotic fibrosis, incurable, with mild symptoms, and not responding to treatment with intravenous tartar emetic, as do the other three.

The hepatic type—Egyptian splenomegaly is given as a synonym—is characterized typically by absence of ova from the stools, but in all cases examined post-mortem [the number is unstated] male worms alone were present. The incubation and first stages are as in the intestinal form. The second stage is marked by enlarged, hard, and often tender liver and spleen generally reaching at least half way to the umbilicus. A chlorotic anaemia is accompanied by leucopenia (average 4,500) and relative lymphocytosis. The third or ascitic stage, seen in 2 per cent. of the series, shows hardening and contraction of the liver with ascites and increasing weakness and wasting. In the first and in the beginning of the second stage intravenous tartar emetic cures; in the latter part of the second it may ameliorate the condition; in the third it is unavailing and the patient dies within a year of the onset of ascites.

C. L.

GIRGES (Rameses). **Pathology of Schistosomiasis Mansoni**.—*Jl. Trop. Med. & Hyg.* 1930. Jan. 1. Vol. 33. No. 1. pp. 1-7. With 6 text figs.

GUIRGIS (Ramsis). **Pathology of the Bilharzia Mansoni**.—*Jl. Egyptian Med. Assoc.* 1929. Dec. Vol. 12. No. 10. pp. 204-217.

These papers are identical except for a few words and for the presence of figures in one. The histology of papillomata, ulcers, tumours and tubercles is detailed, as well as of the hepatic lesions.

C. L.

MANSON-BAHR (Philip). **On a Case of Schistosomiasis mansoni associated with Splenomegaly and Anaemia in a European. (The First Recorded Instance from Tanganyika Territory.)**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Apr. 25. Vol. 22. No. 6. pp. 507-508.

This is believed to be the first case of schistosomiasis reported from Tanganyika Territory. The man died in England of interstitial nephritis. Eggs of *S. mansoni* had been present in the faeces; liver and spleen were enlarged and hard. The number of eggs in each faecal preparation varied greatly from day to day, but they disappeared after injection of $17\frac{1}{2}$ grains of antimony tartrate.

C. L.

RAYNAL (J.). *Schistosoma mansoni* chez le Malgache. [*S. mansoni* in **Madagascar.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Jan. 1. Vol. 7. No. 1. pp. 10-28. With 2 maps in text. [10 refs]

Infection is heaviest in the southern plateau of the island, 55.3 per cent. of 170 examinations. Four preparations of undiluted faeces under a cover examined on a mechanical stage were used for diagnosis. In the north no infection was found.

C. L.

PERRY (H. Marrian). **The Occurrence of Schistosome Ova in the Spleen in Egyptian Splenomegaly.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Apr. 25. Vol. 22. No. 6. p. 543.

Marrian Perry points out that the statement that eggs of *S. mansoni* are present in the liver and other viscera but not in the spleen is incorrect. He has found the ova in the spleen in man and BRUMPT has presented him with sections of the spleen of an experimentally infected mouse with numerous ova in them.

C. L.

HARPER (J.). **Japanese Schistosomiasis. Report of a Case in which the Diagnosis was made following an Appendectomy.**—*U.S. Nav. Med. Bull.* 1929. July-Oct. Vol. 27. Nos. 3-4. pp. 661-668. With 1 plate. [18 refs.]

A dull pain developed in the right lower abdomen six years after the patient's only foreign service—in China. Two years later, the discomfort persisting, a normal-looking appendix was removed which on section contained abundant eggs of *S. japonicum*, the first discovered evidence of infection. While under observation after operation "an egg of *S. japonicum* was found in each of 4 separate stools after concentration." They contained miracidia, but these were not found to hatch. Complement fixation, intradermal and blood serum aldehyde tests were negative. After the operation some discomfort in the right lower abdomen persisted after food.

C. L.

KAWAMURA (R.). **The Recent Researches on Schistosomiasis Japonica in Japan.**—*Japan Med. World.* 1929. May 15. Vol. 9. No. 5. pp. 165–170.

In a section headed Serological Reaction and Immunity, Kawamura refers to certain serological studies and immunity experiments undertaken in his department. Contrary to general experience, he reports that saline extracts of parasites prepared by MIYAJI and IMAI constituted superior antigens to alcoholic extracts manufactured from either adult schistosomes or cercarial infected livers. MIYAJI and IMAI using a similar saline extract also developed a precipitin reaction. By means of both these tests reliable serological diagnoses were readily made in *S. japonicum* infection.

In the first group of immunity experiments infected animals after treatment with intravenous injections of antimony were re-exposed to cercariae. No eggs or only a few eggs were demonstrable in the faeces, and at autopsy limited numbers of schistosomes were found in the portal veins. The development of worms was regarded as being retarded in comparison with untreated animals, and the question arose as to whether the immunity so produced originated from living or dead worms. Another series of animals therefore received two to four injections of a schistosome saline extract before being exposed to cercariae. The number of parasites recovered at autopsy never exceeded 100 and the slight changes noted in the inoculated animals as compared with the non-injected controls were regarded as indicating some grade of acquired immunity. A similar degree of protection was obtained in animals injected with sera derived from heavily infested definitive hosts, and Kawamura concluded that active immunity developed against *S. japonicum* not only in the tissue of animals but also in the human body.

[Actually the numbers of cercariae applied in these experiments were never numerically estimated, infection being produced by merely "smearing the shaved abdominal skin with the snails' livers containing active cercariae." Such a technique cannot ensure the exposure of control and experimental animals to an equivalent dosage of cercariae, and for this, if for no other reason, the validity of these experimental results is questionable.]

N. Hamilton Fairley.

BRUMPT (E.). Cycle évolutif complet de *Schistosoma bovis*. Infection naturelle en Corse et infection expérimentale de *Bullinus contortus*. [**Developmental Cycle of *S. bovis* in Corsica.**—*Ann. Parasit. Humaine et Comparée.* 1930. Jan. 1. Vol. 8. No. 1. pp. 17–50. With 17 text figs. & 8 figs. on 2 plates. [50 refs.] [Antimalaria Station, Porto-Vecchio, & Parasit. Lab., Faculty of Med., Paris.]

A furco-cercaria, not *Cercaria octadena*, found in *Bullinus contortus* has grown into typical *Schistosoma bovis* in mouse, hedgehog and guinea-pig. Its distribution in the island of Corsica is very restricted. The paper contains, however, much of interest regarding human schistosomiasis. An attempt was made to determine the fecundity of *S. bovis* and *S. mansoni*. It was first noted that mice infected with *S. mansoni* presented eggs on the 36th day; and that one infected 63 days earlier with *S. bovis* showed eggs, while none killed at a still earlier date did so.

These intervals after infection were tentatively accepted as of general application. The procedure was to infect a mouse and kill it on a definite day, crush the liver and count the eggs in a known fraction of it, and section a known fraction of the small intestine and count the eggs found. The number of female schistosomes discovered in the veins was noted, and the number of days since the estimated date of maturity. It was thought that females missed from the veins on the one hand, and eggs laid in other organs on the other, might more or less cancel one another. In this way it was calculated that a female *S. mansoni* layed 157 and 191 eggs daily in two mice and a female *S. bovis* 60, 111, and 25.5 in three others. The cercaria of *S. bovis* was of the same size as those of *S. haematobium* and *S. mansoni* when preserved in the same manner. The details of its internal anatomy are to be the subject of a later report.

C. L.

BRUMPT (E.). Cycle évolutif du *Schistosoma bovis* (= *Bilharzia crassa*), infection spontanée du *Bullinus contortus* en Corse. [**Developmental Cycle of *S. bovis*, a Natural Infection of *B. contortus* in Corsica.**—*C.R. Acad. Sci.* 1929. Nov. 18. Vol. 189. No. 21. pp. 879–881.]

The fork-tailed cercaria of *S. bovis* resembles that of the human schistosome in this particular, in being without an oesophageal bulb and, in Corsica, in using *Bullinus contortus* as intermediate host, as does *S. haematobium* in Egypt. Accordingly fork-tailed cercariae in *B. contortus* must not be assumed to be certainly those of *S. haematobium*.

C. L.

CAWSTON (F. G.) *Schistosoma bovis* in South Africa. [Correspondence]—*Lancet*. 1929. Sept. 28. pp. 690–691. [1 ref.]

LE ROUX, of the Veterinary Department, Onderstepoort, has observed that after massive doses of tartar emetic *S. bovis* is apt soon to be found dying in the lung. This may perhaps explain, it is said, the appearance of temporary colds in human beings treated with large doses of this drug.

PRAETORIUS (G.). Besteht eine Bilharziagefahr für Deutschland? [**Is there a Bilharzia Danger for Germany?**—*Muench. Med. Woch.* 1929. Dec. 6. Vol. 76. No. 49. pp. 2055–2056. [Municipal Hosp., Siloah, Hannover.]

It is concluded that no large epidemic of schistosomiasis can occur in of the establishment of local foci, and that there is no need to make the Germany, that experience and experiment are silent on the possibility infection notifiable.

C. L.

PIRIE (J. H. Harvey). **Appendicitis caused by Bilharzia.** [Correspondence.]—*Brit. Med. Jl.* 1929. July 20. p. 125.

In view of HARRIS's record of bilharzial appendicitis which he believed to be new, Pirie refers to his twenty cases already published [this *Bulletin*, Vol. 22, p. 465].

C. L.

McCoy (Oliver R.). **Seasonal Fluctuation in the Infestation of *Planorbis trivolvis* with Larval Trematodes.**—*Jl. Parasit.* 1928. Dec. Vol. 15. No. 2. pp. 121-126. With 1 text fig. [6 refs.] [Zool. Lab., Washington Univ., St. Louis.]

Examination of over 6,500 specimens of *Planorbis trivolvis* collected during two years from Ramona Park Lake near St. Louis, Missouri, showed a widely varying degree of infestation without relation to seasons.

C. L.

CAWSTON (F. G.). **Some Results of Original Research into the Treatment of Chronic Haematuria caused by *Schistosoma haematobium* (Bilharz) and its Associated Trematode Parasitic Worms.**—*Jl. Roy. Army Med. Corps.* 1929. Dec. Vol. 53. No. 6. pp. 416-427. [14 refs.]

This paper brings into reasonable and compact form observations contained in the many scattered papers which Cawston has written and which have already been abstracted in this *Bulletin*.

C. L.

ASKANAZY (M.). Die durch Schistosomen erzeugte Leberzirrhose und Milzschwellung. [**Liver Cirrhosis and Splenomegaly produced by Schistosomes.**]—*Schweiz. Med. Woch.* 1929. Jan. 19. No. 3. pp. 50-55. With 1 text fig. [19 refs.]

A summary of work done during the last fifteen years.

C. L.

JOURNAL OF THE MEDICAL ASSOCIATION OF SOUTH AFRICA. 1929. Oct. 26. Vol. 3. No. 20. pp. 577-578.—**The Standard Treatment of Bilharzia.**

Careful and detailed instructions are given for the mass treatment of bilharzia patients. They are issued by the Department of Public Health. It is insisted upon that every patient shall lie down for an hour after injection whether feeling well or ill.

C. L.

MAZZA (Salvador) & BIANCHI (Andres E.). Notas sobre las verminosis apendiculares en Buenos Aires. [**Worms in the Vermiform Appendix.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1929. Vol. 5. No. 41. pp. 255-262. With 8 text figs. [3 refs.]

BRUMPT having recorded as containing Oxyuris 3.5 to 4 per cent. of 800 appendices examined at necropsy, and 37 per cent. of those removed from children with appendicitis, the authors examined 993 specimens from two hospitals, 498 from one, 495 from the other.

Oxyuris was found in two of the former and three of the latter, that is, in 0.5 per cent. Microscopically, a local eosinophilia might be present, but not the signs of definite inflammation of the viscus. One showed wasting of the follicles and fibrosis of the submucosa.

H. Harold Scott.

- i. CONNOR (Frank P.). **The Surgical Aspects of Filariasis.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 205–212.
- ii. CHATTERJI (K. K.). **Facts bearing on the Surgical Pathology of Filariasis.**—*Ibid.* pp. 213–218. With 9 figs. on 3 plates (1 coloured).

i. This paper was written to emphasize the backward state of knowledge of some aspects of the life history of *Filaria bancrofti*, particularly the stage between infection and the reaching of adult life, and of the pathology of the condition it produces. Moreover, there is no drug which can be relied upon to kill the worms. That surgery should be needed is a confession of failure to diagnose and disinfect in the early days of infection. The ordinary methods employed are too well known to call for the author's description, but he lays stress on the need of energetic treatment of funiculitis; in advanced cases the surgeon must not hesitate to excise testis and cord. The surgical treatment of hydrocele is described in detail.

ii. The histology of certain elephantoid tissues is described. An interesting report is that of an opened cavity which refused to heal, until the introduction of the finger extracted from its interior a smaller cyst which seems to have had a torn-off pedicle. Its fluid contents held numerous microfilariae and, as appears from a legend to a figure, many smaller cysts. Its wall, judging by another figure, had a strikingly laminated appearance.

C. L.

VAN GULIK (P. J.). Microfilariasis in de Ketaunvlakte. [**Microfilariasis in the Ketaun District.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Dec. 1. Vol. 69. No. 12. pp. 1141–1148. With 1 map & 2 figs.

After examining 2,015 individuals in this district (West Sumatra) the author concludes that the population of villages on altitudes of less than 2,300 ft. is slightly infected with *Microfilaria malayi*, Brug. In people from higher situated villages no microfilarial infection was found. The blood samples for examination (thick drops) were taken at 10 p.m.

W. J. Bais.

MOCHTAR (Achmad). *Filaria*-inderzoek te Benkoelen en Omstreken. [**Filaria Research in Benkoelen (Sumatra) and its Surroundings.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Oct. 1. Vol. 69. No. 10. pp. 967–974.

Of 1,051 individuals examined 12·3 per cent. were found infected. The density of the infection is higher in the country (up to 60 per cent.) than in the town (7·5 per cent.). The microfilaria found was *Mf. malayi*, Brug; it showed a nocturnal habit. Apart from eosinophilia in the blood none of the carriers showed any symptoms which could be attributed to the infection. Attempts to infect *Aedes aegypti* with the microfilaria (made with 300 mosquitoes) yielded only negative results.

W. J. Bais.

FLU (P. C.). Over Filariasis te Weltevreden. [**Filariasis in Weltevreden.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. Oct. 1. Vol. 69. No. 10. pp. 975-978. With 4 figs. on 1 plate. [2 refs.]

Some doubt expressed by BRUG as to the correctness of the diagnosis of *Mf. bancrofti* made by Flu in specimens examined at Weltevreden (Java) in 1921, urged the author to look over his old material and therewith to confirm his diagnosis. Moreover, the fact that in Flu's case *Culex fatigans* was easily infected with the parasite, which apparently is not possible with BRUG's *Mf. malayi*, is in support of the correctness of the author's diagnosis.

W. J. Bais.

SANDGROUND (J. H.). *Ternidens deminutus* (Railliet & Henry) as a **Parasite of Man in Southern Rhodesia ; together with Observations and Experimental Infection Studies on an Unidentified Nematode Parasite of Man from this Region.**—*Ann. Trop. Med. & Parasit.* 1929. Apr. 26. Vol. 23. No. 1. pp. 23-32. With 1 text fig. & 1 plate. [6 refs.] [Harvard Med. School, Boston.]

A medical missionary who had spent more than 25 years in Mozambique and the eastern part of Southern Rhodesia was run down, and by the Willis salt floatation method showed strongyle eggs $72\ \mu$ to $103\ \mu$ long by $37\ \mu$ to $45\ \mu$ broad, rather pointed at one end and containing a morula. Culture resulted in an encapsuled larva a sixth to a third longer than the hookworm larva and with the tail terminating abruptly in a truncated stump. With these, infection was produced in a volunteer. Just at this time 8 worms were received by Sandground, washed from stools of a native from Southern Rhodesia, as well as his faeces in formalin which contained eggs similar to those described. The worms were *Ternidens deminutus*. Accordingly 4 cc. of carbon tetrachloride were given to the missionary with no result ; nor were worms recovered from the experimental case. It is noted that the three human infections with *T. deminutus* have been in negroes from Central East Africa.

[Eggs having the appearance described and not disappearing under treatment are relatively commonly recovered from the faeces of East Indians and others by direct centrifugal floatation. By this method CHANDLER found in 10 per cent. of tea garden coolies in Darjeeling eggs which, following the reviewer, he identified as those of *Trichostrongylus* (this *Bulletin*, Vol. 24, p. 191).]

C. L.

FRÓES (Heitor P.). Identificação de larvas de nematoide num exsudato pleural sero-hemorrágico.—*Brasil-Médico*. 1929. Sept. 21. Vol. 43. No. 38. p. 1127.

——. **Identification of Nematode Larvae in the Exudate of a Sero-Haemorrhagic Pleural Effusion.**—*Jl. Trop. Med. & Hyg.* 1930. Jan. 15. Vol. 33. No. 2. pp. 18-19.

——. Larves de *Strongyloides* dans un épanchement séro-hémorragique de la plèvre. (Note préliminaire).—*Ann. Parasit. Humaine et Comparée*. 1930. Mar. 1. Vol. 8. No. 2. pp. 170-172. [Faculty of Med., Bahia, Brazil.]

Active unsheathed larvae were found in aspirated pleural effusion ; after death centrifugal precipitates of pleural and pericardial effusions showed more. They were also present in the blood of the lungs.

"The examination of the faeces [after death] showed an enormous amount of turbulent larvae which were diagnosed as strongyloides" which on a minute study were identical in shape, form and movements with those previously found in the pleura. They were "rhabdoid" and not strongyloform. It is believed that they came to the pleura from the intestine.

C. L.

ACKERT (James E.) & NOLF (L. O.). **New Technique for collecting Intestinal Roundworms.**—Reprinted from *Science*. 1929. Sept. 27. Vol. 70. No. 1813. pp. 310–311. With 1 text fig.

This technique applies to removal of worms from the intestine of freshly killed animals only, for "as the intestine loses the body heat the mucous secretions from the intestinal glands pour into the spaces between the villi and soon all other material in the lumen of the intestine becomes embedded in viscid opaque mucus." In the freshly killed animal the intestine is rapidly removed and cut into 1-foot lengths. Over a conical nozzle fixed on a tap one end of each piece of intestine is slipped and hot water between 35° C. and 60° C. is run through. Higher or lower temperatures cause intestinal spasm. The washings are caught in an Erlenmeyer flask, preserved in 4 per cent. formalin, and examined in Jenner's stain, which the worms do not easily take up and so stand out against readily staining intestinal debris. In the two control experiments made, subsequent scraping of the mucosa gave no worms, while the flushed intestinal contents gave 319, varying in length from 3.2 mm. to 95.2 mm.

C. L.

VAN THIEL (P. H.). **The Strongyloid Larvae of Mine Worms in Man and Dog.**—*Acta Leidensia (Scholae Med. Tropicae)*. 1928. Vol. 3. pp. 345–348.

Van Thiel gives the following as generic differences between the infective larvae of *Necator*, *Ancylostoma* and *Uncinaria*. The dorsal lining of the mouth cavity is thicker in the last two; striation of the sheath decreases in definiteness from *Necator* through *Ancylostoma* to *Uncinaria*; the tail of the sheath is sharp in *Necator* and *Ancylostoma* but blunter in *Uncinaria*; the oesophageal bulb is irregularly notched in outline in *Necator* and *Ancylostoma* but not in *Uncinaria*; in *Necator* oesophageal and intestinal lumens are wide but in the other two narrow, while a series of cells yet further narrows the lumen at the junction of the two organs; the larva of *Necator* has no lips, those of the other genera have three. Within the same genus no specific differences are detectable.

C. L.

DUKELSKY (O.) & GOLUBEWA (E.). Ueber die Natur der Allergie durch Askariden. [**The Nature of Allergy in Ascariasis.**]—*Cent. f. Bakt.* I. Abt. Orig. 1928. Sept. 26. Vol. 108. No. 7/8. pp. 449–454. [7 refs.] [Microbiol. Research Inst., Education Commissariat, Moscow.]

Guineapigs were injected intravenously with the body fluid of *Ascaris megalocephala*. Some had been sensitized by previous subcutaneous injection of the same fluid, others had not and were used as

controls. The accompanying table shows the results on the two groups :—

Test dose in cc.	Weight of Animal in g.	Fatal Shock.	Non-fatal Shock.	No shock.	Totals.
Sensitized animals.					
1.0	320	2	1	0	3
0.5	400	6	0	0	6
0.4	400	5	1	0	6
0.3	400	1	2	0	3
Controls.					
1.0	400	0	1	0	1
1.0	320	1	0	0	1
0.5	400	0	2	0	2
0.4	400	1	2	3	6

C. L.

CHIASSEIRINI (Angelo). Ascaridiosi delle vie biliari. [**Ascaris in the Bile Ducts.**]—*Polislinico*. Sez. Prat. 1929. Dec. 23. Vol. 36. No. 51. pp. 1867-1868. [Civil Hosp., Venice.]

A woman of 44 years complained of severe pain in the right hypochondrium and was slightly jaundiced. Owing to the severity of the pain gall-stones were suspected and operation undertaken. An *Ascaris* was found in the hepatic duct and its removal resulted in cure.

H. Harold Scott.

FÜLLEBORN (F.). On the Larval Migration of some Parasitic Nematodes in the Body of the Host and its Biological Significance.—*Jl. Helminthology*. 1929. Mar. Vol. 7. No. 1. pp. 15-26. With 5 figs. (3 on 1 plate). [42 refs.]

Fülleborn, in a fascinating lecture, illustrated by lantern, brought into an hour's instructive entertainment a mass of material which has appeared over his signature in a number of publications.

C. L.

FAIRLEY (Keith D.), FAIRLEY (N. Hamilton) & WILLIAMS (F. Eleanor). **Some Fallacies in the Intradermal Test for Hydatid Disease.**—*Med. Jl. Australia*. 1929. Sept. 7. 16th Year. Vol. 2. No. 10. pp. 320-333. [31 refs.] [Walter & Eliza Hall Inst. of Research, Melbourne.]

In a paper recently reviewed in this *Bulletin*, K. D. Fairley showed that many patients yielding an immediate reaction to the intradermal injection of hydatid fluid revealed no other evidence of echinococcosis. The present article concerns a detailed enquiry into possible sources of error in this test, and as a result of extensive experimental and clinical observations on man undertaken at the Walter & Eliza Hall Research Institute the basis of many fallacious reactions is made clear. The authors conclude that with the old technique it was the failure to react and not the immediate reaction which was of chief clinical importance, the former finding constituting more reliable evidence of

the absence of hydatid than the latter did of its presence. An improved technique is advised and the conclusion is reached that many of the pseudo-positive results obtained in the past will in the future be avoided by adequate standardization of the antigen, by the exclusion of sensitization to host protein and infestation with other helminths, by the use of the stroke test, and the adoption of standard measurements in diagnosis. Owing to the occasional presence of pharmacologically active substances, the antigen utilized in the new technique is standardized on parasite-free patients as well as on those known to harbour echinococcal cysts. The injection is made on the outer aspect of the arm, but if the patient has been previously subjected to the test another area is chosen, as local sensitization was experimentally demonstrated to follow the repeated injection of hydatid fluid into the same locality.

The dimensions of the wheal in the immediate reaction and of the reddened area of infiltration in the delayed response are always measured. Positive reactions are recorded in wheals measuring 2.4×2.2 cm., doubtful reactions in wheals approximating to 2.0×2.2 cm., and negative reactions if the dimensions are less than these. An immediate response is regarded as of no significance in any patient yielding a triple response to the stroke test or in one giving a positive or doubtful response to the control injection of normal saline solution or sheep serum.

Group reactions dependent on infestation with other helminths were specially studied, and reference to the original paper should be made by those interested in this subject. Both immediate and delayed reactions were observed in non-hydatid patients who had at some time harboured tapeworms other than the cystic stage of *Taenia granulosa*, and some evidence was presented that similar fallacious reactions occur in association with nematode disease. For the proper interpretation of the test it thus becomes essential to exclude concomitant helminthic infestation. Other conditions such as jaundice, asthma, urticaria and pruritus were occasionally associated with pseudo-positive results, but the incidence of these reactions would have been certainly diminished by the adoption of the standard technique.

N. Hamilton Fairley.

GOODALE (Raymond H) & KRISCHNER (Harald). **Biological Tests for Hydatid Disease. A Comparison of the Casoni and Weinberg Tests.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 71-76. [2 refs.] [Path. Dept., American Univ., Beirut.]

In this paper an attempt has been made to compare the results of the intradermal skin test and the complement fixation reaction in hydatid-infested bovines examined subsequently at autopsy. Of 44 cows in which cysts were found, 38 or 86.3 per cent. had a positive skin test and 26 or 59 per cent. yielded positive complement fixation reactions. There were 11 false positive skin tests and 10 false positive complement fixation reactions recorded in 62 non-infested animals. One of the two tests was positive in all of the cows in which hydatid cysts were found. The antigen used for both tests was prepared by filtering through a Berkefeld filter to separate the scolices, the filtrate being subsequently preserved with phenol.

[In man it is well known that carbolized fluids are unsatisfactory for the diagnosis of echinococcosis, as they lead to the development of

false reactions, while filtered hydatid fluids are less potently antigenic for complement fixation work though satisfactory for Casoni tests. For these reasons the results are of doubtful significance.]

N. Hamilton Fairley.

CANTANI (Francesco). Contributo sperimentale alla diagnostica biologica delle cisti da echinococco nell'uomo. [**Experimental Study of the Biological Diagnosis of Hydatid in Man.**—*Riforma Med.* 1929. Nov. 23. Vol. 45. No. 47. pp. 1586, 1588, 1591–1592. [21 refs.]

Tests other than biological were tried, such as the red cell count and the degree of eosinophilia, but these are dismissed in a few words as unreliable. The main work was the testing of 21 cases by Ghedini-Weinberg's method of complement fixation. For antigen was used : (1) Human hydatid fluid kept in the cold ; (2) Fresh fluid from sheep hydatid ; (3) Alcoholic and ethereal extracts of the walls of human cysts. Most successful in his hands was the fluid from the human cyst without addition of any antiseptic or special treatment of any sort. It proved much better than the fluid from the sheep, while ethereal and alcoholic extracts of the cyst-membrane had practically no antigenic power.

H. Harold Scott.

VON BASSEWITZ (E.) & VON BASSEWITZ (Baroneza). A cuti-reacção echinococcica no diagnostico da enfermidade hydatidica. [**The Cuti-Reaction in the Diagnosis of Hydatid Infection.**—*Brasil-Medico.* 1929. Sept. 21. Vol. 43. No. 38. pp. 1138–1142.

Twenty-two years ago the presence of hydatid disease was noted in Rio Grande do Sul. Since then the infection seems to have been continuously increasing. The authors find that intracutaneous injection of 0.1–0.3 cc. of human hydatid fluid sterilized by boiling and adding 2 per cent. chloroform produces a definite allergic reaction in positive cases. The facts that the test may be negative in cases of suppurating cysts and may remain positive for a varying length of time after removal are not sufficient to destroy its value. It is suggested that the test should be tried on all the inhabitants of districts where the disease is known to exist, partly to determine the incidence of the infection and partly to enable the cysts to be dealt with at an early stage. Often when the reaction has been positive, the patient has appeared to be in good health, but careful examination has revealed the presence of a cyst too small to give rise to symptoms.

H. Harold Scott.

LOLLI (Giorgio). La cura medica delle cisti d'echinococco. [**Medical Treatment of Hydatid.**—*Polichinico.* Sez. Med. 1929. Dec. 1. Vol. 36. No. 12. pp. 643–648. With 3 text figs. [7 refs.] [Inst. of Clin. Med., Univ., Rome.]

The author planned to test the result of energetic treatment with neosalvarsan on patients with hydatid, and, if ineffectual, to remove the cyst and examine the fluid to see whether the drug was present or not, to test by experimental inoculation whether the vitality of the

cyst had been affected by the drug, and to study the effect of injection of neosalvarsan with scolices into the peritoneal cavity of a rabbit. He found that neosalvarsan had not the least effect on the course of hydatid in man; it does not affect its vitality, since, when inoculated into rabbits, the contents give rise to fresh cyst formation. Even when the hydatid material is injected simultaneously with the drug, evolution of the cyst is not impeded.

H. Harold Scott.

ERISTAWI (K.). Zwei seltene Echinococcusfälle. [**Two Rare Cases of Echinococcus Infestation.**]—*Nachrichten d. Tropischen Medizin.* Tiflis. 1929. Jan. Vol. 2. No. 1. [In Georgian script. German summary p. 71.]

Case 1. Boy of 9, no eosinophilia or Weinberg, positive intracutaneous reaction to hydatid antigen. Operation for a cyst in the liver was followed by high fever and an erythema covering the whole body, with unconsciousness. These disappeared, but his hair and nails fell out.

Case 2. Man of 27, without Weinberg or intracutaneous reactions, eosinophils 3 per cent., a non-fluctuating liver tumour from which puncture released no fluid. Operation showed a cavity in the liver packed tight with tiny echinococcus vesicles. Recovery.

C. L.

SCHILLING (Viktor). Interessante Fälle von Eosinophilie durch Würmer. I. Glossitis, Allergie und hohe Eosinophilie durch abgestorbenen Bandwurm. II. Biologische Kurve der Leukozyten bei Echinokokkenperitonitis. [**Interesting Cases of Eosinophilia caused by Worms.**]—*Abhandl. a. d. Gebiet d. Auslandskunde.* Hamburg. Univ. 1927. Vol. 26 (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 481-492. With 2 charts in text. [1 ref.] [I. Med. Clinic, Berlin.]

I. The explanation of an eosinophilia of 53.5 per cent. with stomatitis and intestinal catarrh, but with no helminthic eggs found in the stools, was cleared up when next day the patient brought in a headless, much macerated strobilus of *T. solium* whose uteri contained no ripe eggs.

II. A hepatic cyst forming a hypochondriac bulge as big as an orange and accompanied by no eosinophilia burst into the peritoneal cavity while under observation. It took a week before eosinophils were invariably to be found in the blood; after about a fortnight they began to increase markedly, and in three weeks they were over 40 per cent. of all leucocytes. Detailed charts show the leucocytic counts and the dates of four paracenteses.

C. L.

ALEXEIEFF (Georges). Sur la question de la clinique de l'anquilostomiase.—*Pensée Méd. d'Usbéquistan et de Turquemenistan.* Tashkent. 1929. Aug.-Sept. No. 11-12. pp. 28-43. [22 refs.] [In Russian. French summary pp. 124-125.]

BRUMPT (E.). Rôle des bilharzies dans la production de certains cancers. Etude critique à propos d'un cas nouveau.—*Ann. Parasit. Humaine et Comparée.* 1930. Jan. 1. Vol. 8. No. 1. pp. 75-101. With 10 text figs. [51 refs.] [Parasit. Lab., Faculty of Med., Paris.]

CAWSTON (F. Gordon). Some Simple Truths in the Study of Schistosomiasis.—*Prescriber.* 1929. Aug. Vol. 23. No. 8. pp. 265-266.

- COUTELEN (F.). Les cancers parasitaires d'origine bilharzienne et leur prophylaxie.—*La Lutte contre le Cancer*. 1929. Vol. 7. p. 319. [Summarized in *Bull. Inst. Pasteur*. 1929. Nov. 30. Vol. 27. No. 22. p. 1010.]
- FAMULÀRI (S.). Il tetracoloruro di carbonio nella cura dell'anchilostomiasi.—*Arch. Ital. Sci. Med. Colon.* 1928. May. Vol. 9. No. 5. pp. 288-291. [1 ref.] [Inst. of Path. & Clin. Med., Univ., Messina.]
- HASSLER (E.). Ueber Hakenwurminfektion und volkstümliche Antihelminthica in Paraguay.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Aug. Vol. 32. No. 8. pp. 409-410. [1 ref.]
- HOEPLI (R.). Ueber Beziehungen zwischen degenerativen Gewebsveränderungen und Ausscheidungen parasitischer Nematoden.—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26 (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 177-183. [15 refs.] [Univ., Amoy, China.]
- KESSLER (Ad.). Kurze Mitteilungen ueber Behandlung wurminfizierter Patienten mit Thymol.—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26 (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 229-231. [3 refs.]
- LIU (K. B.). Schistosomiasis Japonicum (Report of a Case).—*China Med. Jl.* 1929. Aug. Vol. 43. No. 8. pp. 812-815. [3 refs.] [General Hosp., Wuhu, An.]
- MIYASAKI (Satoru). Ueber die sog. "Lebersperre" bei Anchylostomiasis.—*Okayama-Igakkai Zasshi (Zent. d. Okayama Med. Gesellsch.)*. 1928. Oct. Vol. 40. No. 10 (465). pp. 2235-2243. [27 refs.] [In Japanese. German summary p. 2244.] [Med. Clinic, Univ., Okayama.]
- MOLLOW (W.). Ueber das Seretin, einen reinen Tetrachlorkohlenstoff, als Wurmbabtreibungsmittel.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. June. Vol. 32. No. 6. pp. 329-330. [1 ref.] [Internal Clinic, Univ., Sofia, Bulgaria.]
- NEVEU-LEMAIRE (Endjume). Répartition de la bilharziose vésicale en Irak.—*Ann. Parasit. Humaine et Comparée*. 1929. Jan. 1. Vol. 7. No. 1. pp. 1-9. With 1 folding map. [9 refs.] [Parasit. Lab., Faculty of Med., Paris.]
- ŌBA (T.). On the Morphological Changes of the Blood in Ancylostomiasis and Necatoriasis of Man.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1929. Mar. No. 288. [In Japanese. English summary pp. 17-18.] [Taihoku Hosp., Taihoku.]
- RAYNAL (J.). Sur trois parasitoses à élimination intestinale, fréquentes en milieu colonial indigène : (uncinariose, distomatose et bilharziose).—*Rev. Prat. Malad. des Pays Chauds*. 1929. Oct. Year 8. Vol. 9. No. 10. pp. 459-462, 465-470.
- REVISTA DE LA CONFERENCIA SANITARIA NACIONAL. Caracas. 1930. Jan. Vol. 1. No. 2. 64 pp.—Programa para el año de 1930 : Anquilostomiasis en Venezuela.
- SUKHAVANAM (B.). Roundworm Infection simulating Appendicitis.—*Indian Med. Gaz.* 1929. May. Vol. 64. No. 5. p. 261.
- TIMPANO (P.). La cura dell'anchilostomiasi col tetracoloruro di carbonio.—*Policlinico. Sez. Prat.* 1929. Mar. 11. Vol. 36. No. 10. pp. 341-343.

YELLOW FEVER.

CAZANOVE (F.). Etudes sur la fièvre jaune. [**Studies on Yellow Fever.**]
—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9.
pp. 793-817.

The author gives some clinical observations on cases of yellow fever observed at Dakar in 1927. The analysis of urine was found to be of considerable value for prognosis; diminution of albumin was a favourable sign, the quicker the better, and the elimination of chlorides also was favourable. The appearance of bile pigments is a signal of the crisis. The sudden crisis of intoxication is followed in cases of recovery, by an equally sudden disintoxication. In some cases of yellow fever the appearance of albumin in the urine is either prolonged or delayed until after the crisis.

Particulars are given of the use of Noguchi's leptospiral vaccine and serum in Senegal, both of which were found to be without effect for either prevention or treatment.

E. Hindle.

CAZANOVE (F.). Les cas légers de fièvre jaune. [**Mild Cases of Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2.
pp. 161-167.

A description of the clinical symptoms of six mild cases of yellow fever occurring in 1927 at Dakar. Three of these showed complete symptoms of the disease, and the other three only the symptoms of the first period.

Attention is called to the extreme difficulty, apart from animal experiments, of distinguishing between dengue and some of these mild cases of yellow fever and its bearing on the question of prophylaxis.

E. H.

WARNER (R. A.). **A Case of Yellow Fever among Personnel attached to the United States Naval Mission to Brazil.**—*U.S. Nav. Med. Bull.* 1929. July-Oct. Vol. 27. Nos. 3-4. pp. 786-789.

The record of a case of fever, accompanied by jaundice and albuminuria, occurring in a member of the United States Naval Mission to Brazil. The disease clinically resembled yellow fever, but the blood serum of the patient was tested by Dr. W. A. SAWYER and found to confer no protection to monkeys subsequently inoculated with yellow fever virus. The patient had been vaccinated against yellow fever eight days previously, but in view of the results of the tests in monkeys, the fact that jaundice persisted for nearly two months after the attack, and the occurrence of a relapse, spirochaetal jaundice is more probable.

E. H.

COWDRY (E. V.) & KITCHEN (S. F.). **Intranuclear Inclusions in Yellow Fever.**—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 227-299. With 57 figs. on 6 plates (2 coloured). [4 pages of refs.]
[Internat. Health Division, Rockefeller Foundation, New York.]

A very detailed account of the intranuclear inclusions occurring in the liver cells of monkeys and human beings infected with yellow fever [see this *Bulletin*, Vol. 26, p. 301], together with a comparison of the inclusions with those in cases of herpes, chickenpox, submaxillary disease

and Virus III. The paper should be read in its entirety by those interested in the subject, as it includes cytological and experimental details that do not readily lend themselves to abstraction.

The inclusions are formed in the nucleoplasm of the affected hepatic cells as a result of chemical and physical changes and mass movements produced in the nuclei through the direct or indirect action of the virus. The bodies are very readily observed in the living cells, as owing to the extreme necrosis of the liver it is easy in a cover glass preparation to see the separate liver cells and their contents. In the living state the inclusion bodies are readily dissolved, a dilution of only 0.05 per cent. acetic acid causing their immediate disappearance. 1 per cent. ammonia also dissolves them, but more slowly. Distilled water caused swelling of the nucleus, but the relative position of the bodies remained unchanged; 8.5 per cent. NaCl followed by distilled water to restore the shape of the nuclei, also had no effect on the bodies. On the contrary, when the bodies are fixed by Zenker, Bouin, or any other of the ordinary methods they become extraordinarily resistant to the action of solvents. Zenker, containing 5 per cent. acetic acid, was found to be the best fixative for ordinary use. The inclusions were not seen in a monkey killed 24 hours after being inoculated with virus, but were found in those killed on the first day of fever and also in animals dying of the disease as late as 22 days after being inoculated. They were not found in a monkey killed 3 days after the last fever. With the exception of very rare cases in which a few suprarenal cells showed the bodies, they are confined to the liver cells, and many attempts to produce the inclusions by inoculating the virus directly into the other organs of monkeys, and in other species of animals, were unsuccessful. Herpetic inclusions produced in the liver of a *Cebus* monkey were found to differ structurally from those of yellow fever. The latter appear as individual spherical clumps of fine particles, and the nucleoli persist, but in herpes they are more or less even cloud-like deposits of acidophilic particles and the nucleoli are destroyed, or else emarginate on the nuclear membrane.

A comparison was also made with the inclusion bodies in chickenpox, submaxillary disease, and Virus III disease, in addition to the above, and microchemically the bodies found to be alike in many particulars, especially in being acidophilic, so that they can all be stained by basic dyes. The inclusion bodies were found in 10 out of 39 human cases of yellow fever, but although present in man they are seldom so abundant as in monkeys, and are not so useful for the diagnosis of doubtful cases as in the case of monkeys. This difference in the incidence of inclusion bodies is correlated with other differences in the hepatic lesions. In man: (1) The midzonal necrosis is slightly less extensive and the central border of non-necrotic cells is more frequently greater than the peripheral border in human livers, than in monkeys. (2) The cellular response is different, macrophages outnumbering polymorphs. (3) The fatty change is less extensive. (4) Pigmentation is more marked. (5) Hyaline bodies are more conspicuous. (6) The maximum and average nuclear size are greater. (7) The type of nuclear change is different; lysis is more evident than rhexis. (8) Nuclear budding is seen. (9) Empty nuclei are fairly abundant. (10) Vesiculated nuclei are common. (11) Mitoses are less frequent. (12) The number of nucleoli is increased, and also they are hypertrophied to a much greater degree.

The detailed examination of infected mosquitoes did not result in the discovery of any inclusion bodies, or of any micro-organisms likely to be of aetiological significance in this disease.

The general conclusions are that the nuclear response of the liver cells in yellow fever is of the same general type, though different in detail from that occurring in many other virus diseases, especially chickenpox, herpes, virus III disease, and submaxillary disease.

E. H.

TORRES (C. Magarinos). Morphologie des inclusions hépatiques dans la fièvre jaune humaine. [**The Morphology of the Hepatic Inclusions in Human Cases of Yellow Fever.**].—*C.R. Soc. Biol.* 1929. Nov. 4. Vol. 102. No. 28. pp. 410–412. With 1 text fig. [Oswaldo Cruz. Inst., Rio de Janeiro.]

The author has found the characteristic intranuclear bodies in the liver cells of a yellow fever patient in Brazil, who died about 40 hours after first showing symptoms of the disease. Seven other patients, of whom four had certainly died after the third day of the disease, showed no signs of any nuclear changes in the liver. The author is of the opinion that the appearance of intranuclear bodies in the human liver is associated with the presence of virus in the tissues.

E. H.

TORRES (C. Magarinos). Altérations du nucléole des cellules du foie dans la fièvre jaune. [**Alterations in the Nucleolus of Liver Cells in Yellow Fever.**].—*C.R. Soc. Biol.* 1929. Nov. 4. Vol. 102. No. 28. pp. 414–415. With 1 text fig. [Oswaldo Cruz Inst., Rio de Janeiro.]

The author states that sections stained with haematoxylin and eosin are not sufficient, at any rate with human tissue, to distinguish the characteristic intranuclear bodies of yellow fever from hypertrophy of the nucleolus. It is necessary to employ special methods such as that used by GOODPASTURE for Negri bodies, when the intranuclear bodies can be clearly differentiated from altered nucleoli. This method consists of staining in anilin carbol fuchsin, differentiating with alcohol, and finally staining with Loeffler's alkaline blue. With this method the nucleoli and also any fragments of it are coloured red, whilst the intranuclear bodies characteristic of yellow fever are coloured a violet-blue.

E. H.

PENNA (Oswino) & DE FIGUEIREDO (Burle). Diagnostico histopatologico da febre amarella pelas lesões de Councilman. [**Histological Diagnosis of Yellow Fever by the Presence of "Councilman's Lesions."**].—*Brasil-Médico*. 1929. Dec. 21. Vol. 43. No. 51. pp. 1549–1550. [Oswaldo Cruz Inst., Rio de Janeiro.]

The criteria adopted by the authors for establishing a post-mortem diagnosis of yellow fever are: necrosis of hepatic cells and, scattered among such cells, others isolated which have not necrosed. The dead cells become separated from their neighbours, take on a more or less ovoid shape, their protoplasm is acidophil, the cytoplasm becomes hyaline and loses granularity, contains fat, and the nucleus is pycnotic, karyorrhectic or karyolytic. The oxychromatic granulations, described by TORRES, COWDRY and KITCHEN, they regard as the sign *par excellence* of yellow fever, but they give priority of description to COUNCILMAN.

H. Harold Scott.

TEIXEIRA (J. Castro). [In Portuguese & English.] Do funcionamento renal no febre amarella, na convalescença e após a cura. **Functional Test of Kidney in Yellow Fever during Convalescence and after Treatment.**—*Inst. Oswaldo Cruz, Suplemento das Memorias*. 1929. Jan. & Feb. No. 5. In Portuguese pp. 38–41. With 9 graphs on 9 plates. [5 refs.] In English pp. 42–45. [5 refs.]

The author gives the results of testing the renal functions of four convalescent yellow fever patients and five that had completely

recovered. The former showed delay in water elimination and disturbance in dilution and concentration power; there was fair elimination of chlorides and urea. The Aldrich and MacClure test showed a slight tendency of the tissues to hydrophily, the figures ranging from 37 to 46 instead of the normal 60.

During convalescence the phenolsulphophthalein test showed an average elimination during the first hour of 45.2 per cent., whilst the recovered patients gave the normal average of 65 per cent. after the same interval. The restoring of renal function seems therefore to be rapid and complete in the case of yellow fever.

E. H.

CRUZ (J. da Costa). Variations des différentes fractions de l'alexine dans la fièvre jaune. [**Variations in the Different Fractions of Complement in Yellow Fever.**]—*C.R. Soc. Biol.* 1929. Oct. 18. Vol. 102. No. 26. pp. 51-53. [1 ref.] [Oswaldo Cruz Inst., Rio de Janeiro.]

The reduction in the amount of complement in yellow fever patients previously noted by the author [see this *Bulletin*, Vol. 26, p. 1003] was investigated in two cases to see whether the globulin or albumin fractions were affected. The results show that the albumin fraction of the complement is the one that is reduced, the globulin fraction being little affected.

E. H.

MULLER (Henry R.) & TILDEN (Evelyn B.). *Leptospira icteroides* and **Brazilian Yellow Fever.**—*Jl. Amer. Med. Assoc.* 1930. Mar. 22. Vol. 94. No. 12. pp. 856-857. [2 refs.] [Rockefeller Inst. for Med. Research, New York.]

Cultures were made of 66 samples of blood from cases diagnosed as yellow fever in Rio de Janeiro. The blood in every case had been collected during the first 4 days of fever, mixed with sodium citrate, and sent to New York in ship's refrigerators, the journey taking three to five weeks. *Leptospira icteroides* was cultured from the blood of two of these patients, one of whom died of typical yellow fever, and the other suffered from a severe attack of the disease. It is suggested that either Weil's disease and yellow fever may be confused clinically, or that in certain cases of yellow fever, *Spirochaeta icterohaemorrhagiae* appears in the blood as a secondary invading micro-organism.

E. H.

KUCZYNSKI (Max H.) & HOHENADEL (Bianca). **Investigations into the Etiology of Yellow Fever with Special Reference to the Problem of Insect-borne Diseases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 439-486. With 16 charts & 3 figs. on 1 plate. [12 refs.]

An important contribution to the experimental study of yellow fever. Particulars are given of the course of the disease in 272 rhesus monkeys, of which 257 died. The authors recommend the use of blood collected by heart puncture during the first 24 hours of fever, for maintaining the disease in passage, although both fresh liver emulsion and the bites

of infected mosquitoes are equally fatal. In studying the pathological changes in these animals there is one very marked difference from man, for infected monkeys continue to feed until the last day of the disease, whilst even in mild cases human beings refuse nourishment, and consequently there is an early change in the blood and a decrease in its sugar content.

The authors confirm their previous observations as to the extreme susceptibility of marmosets and saimiri monkeys, but find that *Cynomolgus* shows considerable variation in its susceptibility. They also find that the West African green monkey, *Cercopithecus* sp., can be infected in the laboratory with yellow fever from rhesus monkeys. Five passages were made in *Cercopithecus* monkeys and rhesus monkeys were infected from them on three occasions. The illness is much milder than in rhesus. In *Cebus* the type of infection was found to be quite different from that in other monkeys. Extreme hepatic glycopenia and consequent necrobiosis of the liver cells was completely lacking even in fatal infections, and in cases where the blood harboured the virus for 8 to 10 days.

The guineapig was also found to be susceptible to infection with yellow fever, the best results being obtained by a preliminary poisoning with phlorhidzin. The intraperitoneal inoculation of 2 cc. daily of a saturated solution for 4 to 7 days, followed by an inoculation of infected monkey's blood, is the most certain method of producing infections. Many of these were fatal and the animals showed fatty degeneration of the liver, due to the phlorhidzin, but without necrosis. Numerous gastric ulcers are often visible, and sometimes black haemorrhages in the stomach and haemorrhages in the lungs. Some of the animals showed fever and many of them died of the infection after intervals ranging from 4 to 26 days after being infected. The authors were successful in maintaining yellow fever in guineapigs through six or seven passages from animal to animal, and at the same time repeatedly reproduced the infection in rhesus monkeys by the injection of liver or, with less certainty, blood, of these infected guineapigs.

The pathological changes produced in guineapigs by yellow fever are discussed in detail and an interesting parallel drawn between the "autonomic-gastric" effect of *Corynebacterium diphtheriae* and that of the diphtheroid *B. hepatodystrophicans*. Sometimes by injection of liver from dying guineapigs other guineapigs were killed in 16 to 40 hours with extreme paralysis of the intestines, and occasionally with gastric ulcers and haemorrhages in the stomach. There are stated to be two distinct poisonous effects observed in yellow fever: a purely hepatodystrophic effect, which appears to be intimately connected with the metabolism of sugar, and a nervous effect.

Further evidence is brought forward in support of the authors' view that *B. hepatodystrophicans* is the causative organism of yellow fever. One monkey was inoculated with a 17th subculture of the organism that had been kept in culture for 13½ months and the animal died of yellow fever on the 24th day after being inoculated, only showing fever on the 23rd day of the disease. A second monkey inoculated with a 12th subculture died of yellow fever on the 33rd day. A third monkey infected from a culture of the Brazilian virus survived, but blood collected on the 30th day after the inoculation produced a fatal infection in another monkey.

Guineapigs were also infected by cultures, and from one of these animals a monkey was successfully infected with yellow fever.

These and other experiments dealing with the cultural problem are discussed in detail, and in particular the view that live virus might be present in culture tubes together with bacteria. The cultural forms were found to withstand exposure to 0.4 per cent. phenol at room temperature or at room temperature for 5 to 12 days, and yellow fever was produced in monkeys by the repeated inoculation of these phenolized cultures. The site of the virus is next discussed and evidence brought forward supporting the view that it is present in the leucocytes and especially in the monocytes. An interesting experiment supports this view. One of the assistants at the laboratory suffered from a mild attack of yellow fever, with a rise in temperature for 4 days. Four days after the temperature had returned to normal 1 cc. of the patient's blood was mixed with citrate and centrifuged. The citrate plasma was removed and found to be non-infective. The greyish layer of monocytes and leucocytes was then washed twice in physiological saline solution and then inoculated into a monkey which died of yellow fever eight days later.

The article concludes with a discussion of the cultural problem in relation to the authors' former work on typhus.

In the discussion following the paper, Dr. HINDLE described experiments showing that yellow fever virus could be adsorbed by bacilli and suggested that this might be an explanation of some of the positive results obtained by inoculation of subcultures after passage. Dr. OKELL mentioned that he had inoculated 12 guineapigs with large doses of yellow fever virus, but without producing any signs of infection.

E. H.

- i. CRUZ (J. da Costa). Sur l'étiologie de la fièvre jaune (*Bacillus hepato-dystrophicans* Kuczynski, 1929). [**On the Aetiology of Yellow Fever** (*Bacillus hepato-dystrophicans* Kuczynski, 1929).—*C.R. Soc. Biol.* 1929. Nov. 22. Vol. 102. No. 31. pp. 610–613. [2 refs.] [Oswaldo Cruz Inst., Rio de Janeiro.]
- ii. KUCZYNSKI. A propos de la note de M. J. da Costa Cruz sur l'étiologie de la fièvre jaune. [**Concerning da Costa Cruz's Note on the Aetiology of Yellow Fever.**]—*Ibid.* pp. 613–614.

i. The first paper contains an account of observations on a culture of *Bacillus hepatodystrophicans* strain No. 645, obtained from KUCZYNSKI. The morphology of the organism agrees with the previous descriptions. [See this *Bulletin*, Vol. 26, p. 296.] The characters of the cultures are then discussed in detail and it was found that in ordinary media the organism does not develop under aerobic conditions.

With the special media recommended by KUCZYNSKI and in the presence of pieces of organs, the bacillus grew in 2 or 3 days. In the absence of organs the organism only developed when a large quantity of the original culture was introduced, and then it only grew slowly in the top layer of the tubes. Various media were tried and the most satisfactory found to be acid broth containing 1 per cent. glucose with a pH of 6.4. Cultures in this medium furnished abundant growth after 24 to 48 hours, when incubated at 37°C., but only if the cultures were kept under anaerobic conditions.

The fermentation of various sugars was tested in Martin's peptone solution containing 1 per cent. of the sugar. There was intense fermentation of glucose, glycerine and galactose, producing acid but no gas. Growth in

the presence of maltose, mannite, arabinose, raffinose, inulin, dextrose, lactose or saccharose was extremely slow, without any obvious change in the media. The bacillus did not coagulate milk or liquefy gelatine. Cultures were killed by exposure to 55°C. for 30 minutes, but lived for 20 minutes. A mixture of cultures was filtered through a Chamberland F filter at a pressure of 40 cm. of mercury. The filtrate was sterile, all the bacilli being retained by the filter.

The cultures were found to be entirely non-pathogenic when inoculated into mice, guineapigs, rabbits and *Macacus rhesus*. It was found that suspensions of the bacillus were agglutinated by both normal and yellow fever serum of human beings. Hyperimmune serum from a monkey in dilutions of 1 : 20 had no effect on the bacillus. Two *Macacus rhesus* were inoculated, one with 5 cc. and the other with 10 cc. of a rich culture in broth, without any result; 20 days later when inoculated with yellow fever virus they both succumbed to typical infections of the disease.

The author concludes that his results show that this bacillus has no aetiological relation to yellow fever, but its properties suggest that it is a diphtheroid bacillus closely related to *Corynebacterium lymphophilum* Torrey, 1916.

ii. In his reply Professor Kuczynski stated that he had obtained undoubted cases of yellow fever in monkeys by the inoculation of cultures 6-8 months after being isolated. A further note by Dr. da Costa Cruz emphasizes the fact that, apart from their non-pathogenicity, no antigenic relation with yellow fever could be discovered in the cultures studied by him.

E. H.

KUCZYNSKI (Max H.), HOHENADEL (Bianca) & MACCLURE (Ed.).
Versuche mit alten Kulturen des *Bacillus hepatodystrophicans*.
[Experiments with Old Cultures of *B. hepatodystrophicans*.]—*Klin. Woch.* 1929. Oct. 15. Vol. 8. No. 42. pp. 1960-1961.

—, — & —. Gelbfieber in amerikanischen Affen. [Yellow Fever in American Monkeys.]—*Ibid.* pp. 1961-1962.

The first paper contains a record of the infection of a rhesus monkey with yellow fever by the inoculation of old cultures. The monkey was inoculated with the 7th subculture of a Berlin strain, and 7 days later reinoculated with 7.5 cc. of a mixture of four cultures, two being 4th, one a 7th and the other an 8th subculture. These cultures had been maintained for 145 to 258 days and immediately prior to inoculation had been kept from 104 to 127 days without any subcultures being made. After this second inoculation, 7 days later the monkey showed two days of fever and then died of typical yellow fever.

The second paper contains records of the successful infection with yellow fever of 3 species of American monkeys. *Cebus* shows a somewhat atypical infection, but the virus was passed through five of these animals in succession and afterwards produced a typical and fatal infection in a rhesus monkey.

Saimiri (Chrysothrix) sciureus, the squirrel monkey, was found to be extremely susceptible, and the pathological changes closely resembled those occurring in human beings. The animals usually die of the disease within 3 days of being inoculated.

Callithrix jacchus, the common marmoset, was also found to be very susceptible to the disease, and details are given of the passage of the

virus alternately through marmosets and rhesus monkeys. The infection seems to be very severe in this species, all the recorded cases being fatal and the animals showed marked haemorrhages, especially in the large intestine.

E. H.

KUCZYNSKI (Max H.), HOHENADEL (Bianca) & MACCLURE (Ed.). Experimentelle Gelbfieberinfektion amerikanischer Affen wie des Rhesus mit Kulturen des *B. hepatodystrophicans*. [**Experimental Infection of American Monkeys and also Rhesus with Yellow Fever by Means of Cultures of *B. hepatodystrophicans*.**]—*Klin. Woch.* 1930. Jan. 18. Vol. 9. No. 3. pp. 108-110.

The authors succeeded in infecting marmosets and squirrel monkeys, as well as rhesus monkeys, by means of injections of cultures of *B. hepatodystrophicans*. The South American monkeys were all found to be very heavily parasitized, and in addition to various worm infections generally showed secondary pathological changes in the alimentary canal and viscera. As a result it was impossible to obtain pure cultures from the tissues of these animals. Two lots of cultures were tested: the first a Berlin strain that had been cultured for 6 to 10 months, and the second a Brazilian strain cultured for more than 2 months. Fourteen marmosets were inoculated, 7 with each of these strains of cultures. One of those inoculated with the Berlin strain died of typical yellow fever on the ninth day, whilst a parallel monkey that received the same dose died on the same day without any signs of this disease. Similar results were obtained with the Brazilian strain.

The authors discuss the results of their culture inoculation experiments and put forward the view that there may be two kinds of infection produced in monkeys, one the result of the cultural, bacillary form, and the other the result of the virus which develops from the bacillary form. The latter produces typical symptoms of yellow fever, or causes the development of immunity, whilst the former is of low pathogenicity, but may produce febrile symptoms (unlike those in typical yellow fever, however) and exceptionally cause the death of the animal. The marmoset was found to be particularly susceptible to yellow fever infection, and is recommended for use in the diagnosis of cases of this disease in South America.

E. H.

DAVIS (Nelson C.) & SHANNON (Raymond C.). **The Location of Yellow Fever Virus in Infected Mosquitoes and the Possibility of Hereditary Transmission.**—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 335-344. [9 refs.] [Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

An interesting miscellaneous series of experiments on the infectivity of various parts of mosquitoes infected with yellow fever. The virus was found in the head, thorax, and abdomen of mosquitoes before their bites were infective. Infection was obtained by the inoculation respectively of legs, ovaries, salivary glands, mid guts and hind guts of infected *Aedes aegypti*. No transmission was obtained from the inoculation of haemocoelic fluid or of the mouthparts, and also a few attempts to produce infection by the faeces were all negative. Although the ovaries contained virus, the inoculation into monkeys of large

numbers of eggs laid by infected mosquitoes never resulted in the production of either yellow fever or immunity against the infection, and no evidence was obtained in support of the view that hereditary transmission may take place. Adults bred from larvae that had been fed on infected mosquitoes also failed to acquire the infection.

E. H.

ARAGÃO (H. de Beaurepaire) & LIMA (A. da Costa). [In Portuguese & English.] Sobre o poder infectante da haemolympha de mosquitos contaminados com o virus da febre amarella. **On the Contamination of Haemolymph in Mosquitoes infected by the Yellow Fever Virus.**—*Inst. Oswaldo Cruz, Suplemento das Memorias.* 1929. Aug. 31. No. 10. In Portuguese pp. 251–252. With 3 figs. on 1 plate. [1 ref.] In English pp. 253–255.

The authors twice infected monkeys with yellow fever by inoculating them with the legs of infected mosquitoes. They point out that the results of these experiments do not necessarily indicate infection of the contained haemolymph, as the insects had walked over infected faeces and consequently the surface of the legs might have been contaminated. Accordingly in a third experiment the haemolymph was removed from 8 infected mosquitoes, by means of a very fine micropipette, in order to eliminate the possibility of surface contamination. A monkey inoculated with this haemolymph died 7 days later with typical lesions of yellow fever.

E. H.

PHILIP (Cornelius B.). **Possibility of Hereditary Transmission of Yellow Fever Virus by *Aedes aegypti* (Linn.).**—*Jl. Experim. Med.* 1929. Dec. 1. Vol. 50. No. 6. pp. 703–708. [5 refs.] [Internat. Health Division, Rockefeller Foundation, Lagos.]

The author made several attempts to obtain passage of yellow fever virus from infected *Aedes aegypti* to their offspring, but obtained uniformly negative results. The subcutaneous injection of 200 eggs laid by an infective batch of mosquitoes at varying intervals after the first, second, and fourth blood meals produced no reaction in six normal rhesus monkeys. Negative results were also obtained in five biting and two inoculation experiments with the adults that hatched from other eggs laid by the same infective lot of mosquitoes. It is evident, therefore, that under the conditions of this experiment hereditary transmission is highly improbable, for variations in the age and number of blood-meals of the parent and offspring mosquitoes had no effect in producing passage of the virus from one stage of the insect to another.

E. H.

PHILIP (Cornelius B.). **Studies on Transmission of Experimental Yellow Fever by Mosquitoes other than *Aedes*.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 1–16. [7 refs.]

The author finds that *Taeniorhynchus* (*Mansonioides*) *africanus*, Theo., is capable of transmitting yellow fever, for monkeys were infected both by the bites of these mosquitoes and also by the injection of their ground up bodies. Out of four monkeys infected by the

bites of infected *Taeniorhynchus* three died and one recovered, and out of six infected by the inoculation of the ground up insects, five monkeys died of yellow fever. One insect was sufficient to cause a fatal infection. The incubation period of the virus in this species was not determined owing to the low percentage of infection, but the shortest positive transmission by biting occurred after 16 days. Parallel tests with *A. aegypti* resulted in these insects becoming infected eight and nine days respectively after the original infective meal.

Attempts were made to infect *Anopheles gambiae*, Giles (= *costalis*, Lw.), but the virus only persisted in the gut of the mosquito for a maximum period of four days, and the bites were never infective. It is evident, therefore, that this species is not concerned in the transmission of yellow fever in West Africa. On the other hand, *Taeniorhynchus africanus* must be definitely considered in the control of the disease, as it is an important domestic mosquito, readily biting human beings, and experimentally has been shown capable of transmitting the infection.

E. H.

DAVIS (Nelson C.) & SHANNON (Raymond C.). **Studies on Yellow Fever in South America. IV. Transmission Experiments with *Aedes aegypti*.**—*Jl. Experim. Med.* 1929. Dec. 1. Vol. 50. No. 6. pp. 793-801. [4 refs.] [Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

A record of mosquito transmission experiments, using both Brazilian and African strains of yellow fever. 18 fatal infections were produced in monkeys by the bites or injection of infected mosquitoes, 15 due to Brazilian strains and 3 to an African strain, compared with 17 non-fatal infections produced by Brazilian strains. The results of these experiments are difficult to interpret, for although some of the failures are the result of the monkeys being naturally immune, the authors' general experiences show that such animals only account for a part of the total failure in the mosquito transmission. Whereas only 50 per cent. of the mosquito transmission experiments were successful, over 80 per cent. of the blood transfers at the same time were positive. The monkeys which failed to show fever following the bites of presumably infected mosquitoes, later proved resistant to the inoculation of blood or tissues containing virus. This suggests that these monkeys may have been immunized by subinfective doses of virus with or without a slight rise in temperature. The incubation period in monkeys infected by the bites of infected mosquitoes varied from less than 24 hours to 15 days, and as a rule was longer in non-fatal than in fatal infections.

E. H.

DAVIS (Nelson C.) & SHANNON (Raymond C.). **Studies on Yellow Fever in South America. V. Transmission Experiments with Certain Species of *Culex* and *Aedes*.**—*Jl. Experim. Med.* 1929. Dec. 1. Vol. 50. No. 6. pp. 803-808. [6 refs.] [Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

The authors' experiments show that *Aedes (Ochlerotatus) scapularis*, a widely distributed South American species, is capable of transmitting yellow fever virus from monkey to monkey by its bite.

In addition, fatal infections were produced by the injection of the ground-up bodies of both this species and *Aedes (Ochlerotatus) serratus*, which had fed about one month previously on an infected monkey, and a mild infection by a similar injection of *Aedes (Taeniorhynchus) taeniorhynchus*. No definite infection was produced in experiments with *Culex quinquefasciatus*, but some of the monkeys bitten by this species were relatively immune to the subsequent inoculation of virus.

E. H.

EVANS (A. M.). *Aedes (Aedimorphus) apicoannulatus* Edwards and Yellow Fever : a Correction.—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 521–522. [5 refs.]

The examination of specimens of mosquitoes received from a member of the West African Yellow Fever Commission makes it certain that the species referred to as *Aedes (Aedimorphus) apicoannulatus* in BAUER'S transmission experiments [see this *Bulletin*, Vol. 25, p. 848] was really another species, *Aedes occidentalis*, named by the author in 1926. Unfortunately this latter name has been found to have been preoccupied, so a new name *Aedes (Aedimorphus) stokesi*, is proposed for this species, which is the one referred to by BAUER as *A. apicoannulatus*.

E. H.

MONTEIRO (J. Lemos). Sobre a transmissão do virus da febre amarella pelas fézes de persevejos infectados. [**Transmission of Yellow Fever by the Faeces of Infected Bed-Bugs.**—*Brasil-Médico*. 1929. Aug. 31. Vol. 43. No. 35. pp. 1037–1040. With 5 text figs. [Butantan Inst., S. Paulo.]

The author allowed *Cimex lectularius* to bite infected *Macacus rhesus* during the febrile period; for two to twelve days afterwards the bugs were kept in a tube; the faeces emulsified were then injected subcutaneously into other rhesus and produced the clinical and post-mortem appearances of yellow fever. The inference is that a person bitten by *Cimex* might inoculate himself with yellow fever by scratching and rubbing-in infected faeces.

H. Harold Scott.

DINGER (J. E.), SCHÜFFNER (W. A. P.), SNIJDERS (E. P.) & SWELLEN-GRABEL (N. H.). Onderzoek over gele koorts in Nederland (tweede mededeeling). [**Yellow Fever Research in Holland. (Second Communication.)**—*Nederl. Tijdschr. v. Geneesk.* 1929. Sept. 21. 73rd Year. 2nd Half. No. 38. pp. 4378–4383. With 3 charts in text. [5 refs.]

The danger of experimental yellow fever work is clearly demonstrated by the case of one of the authors, who suffered from an acute febrile disease without any characteristic clinical symptoms, but whose blood, injected on the 2nd and 3rd day of the disease into rhesus monkeys, caused in both cases a fatal attack of yellow fever with all the anatomopathological features of this disease. The disease could be transmitted from these monkeys to others by direct inoculation as well as by mosquito bites (*Aedes aegypti*).

The patient recovered. He had probably been infected two days before the outbreak of the disease by the scratch of an infected monkey (which had an open wound at the time).

W. J. Bais.

DINGER (J. E.), SCHÜFFNER (W. A. P.), SNIJDERS (E. P.) & SWELLEN-
GREBEL (N. H.). Onderzoek over gele koorts in Nederland
(derde mededeeling). [**Yellow Fever Research in Holland. (Third
Communication.)**].—*Nederl. Tijdschr. v. Geneesk.* 1929. Dec.
21. 73rd Year. 2nd Half. No. 51. pp. 5982–5991. With 1
plan & 2 figs. in text.

The further tests now applied have established the possibility of transmission of yellow fever by the *Aedes aegypti* mosquitoes of Java. Experiments have been undertaken under very carefully controlled conditions in which infected mosquitoes and rhesus monkeys were the subjects of test. Laboratory-bred mosquitoes were fed upon infected monkeys. Those which were seen to have sucked blood were collected in a special cage in which a guineapig was fixed, on which the mosquitoes could feed. The infectivity of the monkey blood on which the mosquitoes had fed was definitely established. After the incubation period for the mosquitoes, called the "extrinsic incubation," and which experimentally appears to be about 18 days, they were fed in exactly the same careful way on healthy monkeys. In the first place tests on 23 monkeys with infective liver suspension and on 9 monkeys with infective blood gave a mortality of 17 and 9 respectively with an average of 5 days between infection and death. Nine monkeys were bitten by infected *Aedes aegypti* from Java and of these 8 died after, on the average, 5 days. The same species of mosquito from Havana gave rise to 4 deaths out of 6 monkeys, in the average period of 6 days. The mosquitoes used in these tests had been infected 18, 25, 32, and 33 days previously. One monkey, bitten by a mosquito infected only 11 days previously, became sick but recovered, and another, bitten by 2 mosquitoes infected 105 days previously, remained perfectly well. The second of these monkeys showed no sign of immunity, for it succumbed to an inoculation of virulent liver suspension. Thus a demonstration is afforded that the Javan species can transmit yellow fever at least as well as the American species. Experiments with *Aedes albopictus* gave very different results. Out of 10 rhesus monkeys variously bitten by *albopictus* mosquitoes, only one died of yellow fever. These two species of *Aedes* are exceedingly common in the Dutch East Indies and the present experiments confirm the view that the introduction there of yellow fever is a possibility. Other experiments went to prove that the blood of a patient who had recovered from yellow fever had no effect on mosquitoes of an immunizing or a sterilizing character, nor was any inheritance of infectivity established for Javan *Aedes aegypti*.

W. F. Harvey.

DINGER (J. E.). Experimentelle Untersuchungen ueber Gelbfieber. Nach gemeinschaftlichen Untersuchungen von J. E. Dinger, W. A. P. Schüffner, E. P. Sniijders und N. H. Swellengrebel im Instituut voor Tropische Hygiene, Amsterdam. [**An Experimental Investigation of Yellow Fever. The Experiments of J. E. Dinger, W. A. P. Schüffner, E. P. Sniijders and N. H. Swellengrebel at the Institute of Tropical Hygiene, Amsterdam.**].—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 83–87 (167–171).

A general account of the results recorded in the two preceding papers.

E. H.

SNIJERS (E. P.). Beitrag zur Klinik und pathologischen Anatomie des Gelbfiebers (nach Untersuchungen ueber Gelbfieber, von J. E. Dinger, W. A. P. Schüffner, E. P. Snijders und N. H. Swellengrebel mitgeteilt). [**A Study of the Clinical and Pathological Anatomy of Yellow Fever.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 87-93 (171-177). With 3 text figs. [6 refs.]

A detailed account of a laboratory infection occurring in one of the investigators [see above, p. 485]. A monkey inoculated with 1 cc. of the patient's blood collected on the second day of fever died in five days of typical yellow fever. The disease was successfully transferred to other monkeys, and maintained by direct inoculation and also by means of *Aedes aegypti*.

E. H.

DE VOGEL (W.). Les expériences de transmission de la fièvre jaune à l'Institut colonial d'Amsterdam. [**Experiments on the Transmission of Yellow Fever at the Colonial Institute, Amsterdam.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 282-286. With 1 diagram.

The government of the Dutch East Indies has made a law prohibiting any laboratory experiments with yellow fever in that territory. This step has been taken in order to avoid the possibility of the disease being accidentally introduced into the Dutch East Indies, where the natural carrier, *Aedes aegypti*, is very abundant. On the other hand, the government is prepared to give every support to laboratory work in Europe, where there is no risk of this disease becoming established. The Rotterdam Lloyd Company has generously agreed to transport free of charge any laboratory material, such as mosquitoes or monkeys, from any oriental port to Marseilles.

Work on yellow fever has been conducted at the Colonial Institute, Amsterdam, using a French strain of the virus from Senegal. In addition to the results already published [see this *Bulletin*, Vol. 26, p. 1006] it is mentioned that experiments with *Stegomyia scutellaris* indicate that this very abundant species is capable of transmitting yellow fever by its bite. Although only non-fatal infections were thus produced in six rhesus monkeys, the blood of one of these animals collected two days after being bitten produced a fatal infection when inoculated into another monkey.

E. H.

SAWYER (W. A.), KITCHEN (S. F.), FROBISHER, Jr. (Martin) & LLOYD (Wray). **The Relationship of Yellow Fever of the Western Hemisphere to that of Africa and to Leptospiroid Jaundice.**—*Jl. Experim. Med.* 1930. Mar. 1. Vol. 51. No. 3. pp. 493-517. [30 refs.] [Internat. Health Division, Rockefeller Foundation, New York.]

The authors have studied three strains of yellow fever, two African and one Brazilian, with special reference to their serological relationships. Eleven monkeys immunized against an American virus survived inoculation with a highly virulent African strain of yellow fever, and only one showed any fever. The sera of 3 of these monkeys were collected and tested before the test inoculation. All 6 sera protected against death from an African strain, but 6 of the protected monkeys showed fever. Similarly 9 monkeys immunized against the African virus

showed no fever when inoculated with a Brazilian strain of the virus. The sera of 14 recovered human cases of yellow fever in Rio de Janeiro, were then tested for their protective value against the African virus and also against *L. icteroides* or *L. icterohaemorrhagiae*. Of these 14, the sera of 10 persons protected against African yellow fever virus, but not against leptospira; the sera of 2 persons protected against leptospira, but not against African yellow fever virus; and the sera of the remaining 2 persons protected against neither yellow fever virus nor leptospira. It is evident therefore that cases of spirochaetal jaundice (Weil's disease) had been present among those diagnosed as yellow fever in the recent epidemic in Brazil.

The serum taken from a patient 8½ years after an attack of yellow fever in Peru protected a monkey against the African virus. Serum 9 years after an attack in Salvador permitted the development of fever, but prevented death. Serum taken 30 years after an attack in Cuba did not protect.

Experiments with the sera of 6 patients recovered from the African strain showed that the sera all protected monkeys against American yellow fever virus. These observations support the generally accepted view as to the identity of the African and American strains of yellow fever, although marked differences were found in their virulence for monkeys. Out of 24 monkeys inoculated with infected blood of the African strain only one recovered; whilst out of 20 inoculated with the Brazilian virus 15 showed fever and only two died.

E. H.

DAVIS (Nelson C.). **Susceptibility of Capuchin (*Cebus*) Monkeys to Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 321-334. [4 refs.] [Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

The susceptibility of *Cebus* monkeys, possibly *Cebus variegatus*, *C. macrocephalus* and *C. flavus*, has been proved by experiments with 75 of these animals. The monkeys were infected both by the inoculation of blood containing the virus or by the bites of mosquitoes, and the disease was also transmitted from *Cebus* monkeys to Rhesus by means of mosquitoes. Recovered *Cebus* monkeys were found to be immune against reinfection, and their serum generally protected Rhesus monkeys against the disease. At least one animal died as a result of the infection and showed extensive necrosis of the liver.

[This paper is an extension of one published previously (see this *Bulletin*, Vol. 26, p. 1000). KUCZYNSKI and HOHENADEL (this *Bulletin*, ante, p. 86) also showed that *Cebus* monkeys were susceptible, and ARAGAO, the allied *Pseudocebus azarae*.]

E. H.

PETTIT (Auguste) & STEFANOPOULO (Georges). Réceptivité de divers singes pour le virus amaril. [The Receptivity of Various Monkeys to Yellow Fever.]—*C.R. Soc. Biol.* 1929. Nov. 22. Vol. 102. No. 31. pp. 561-563.

A summary of observations on the receptivity of monkeys to the virus of yellow fever. Two *Cercopithecus griseo-viridis*, 2 *C. callitrichus*, 2 *Papio sphinx* and 4 *Cynocephalus hamadryas* were inoculated intra-

peritoneally with large doses of infected liver, but showed no signs of any infection. Summarizing the observations, it seems that members of the genus *Macacus* (and especially *M. rhesus*) are particularly susceptible; certain Brazilian monkeys (*Chrysotrrix sciurus*, *Cebus macrocephalus*) are slightly susceptible; whilst all African monkeys tested up to the present are completely refractory.

E. H.

PETTIT (Auguste) & STEFANOPOULO (Georges). Infections expérimentales inapparentes provoquées par le virus amaril chez les singes réceptifs. [**Experimental Inapparent Infections produced by Yellow Fever in Susceptible Monkeys.**]—*C.R. Soc. Biol.* 1929. Dec. 6. Vol. 102. No. 33. pp. 719-722.

Various authors have recorded that monkeys might die of yellow fever without showing any characteristic symptoms of the disease and the present article contains a record of two such infections. The first, a *Cynomolgus* monkey, was inoculated with infected liver and showed no rise in temperature during a week and seemed in good health, although a rhesus monkey inoculated with the same virus died in six days. On the third day after inoculation 5 cc. of blood was removed and inoculated into a normal monkey, which died 4 days later of typical yellow fever. On the 15th day the *Cynomolgus* monkey seemed ill, and, after collecting blood, was killed, but no signs of yellow fever could be found. Some of this blood of the 15th day was dried *in vacuo* and 16 days later inoculated into a rhesus monkey, which died of yellow fever 19 days after the inoculation. The second case, a rhesus monkey, was inoculated with virus and showed no rise in temperature for 8 days and no signs of illness until the 36th day, when it suddenly died with the typical pathology of yellow fever. Blood collected on the 30th day was mixed with virus and inoculated into a normal monkey, which died of yellow fever 5 days later, showing that the blood of the original monkey did not contain immune bodies against the virus. As the authors remark, it is necessary to be on the look-out for these inapparent infections in human beings and especially amongst the natives of endemic regions.

E. H.

HUDSON (N. Paul) & PHILIP (Cornelius B.). **Infectivity of Blood during the Course of Experimental Yellow Fever.**—*Jl. Experim. Med.* 1929. Nov. 1. Vol. 50. No. 5. pp. 583-599. With 5 charts in text. [8 refs.] [Internat. Health Division, Rockefeller Foundation, Lagos, Nigeria.]

Five rhesus monkeys were inoculated with yellow fever virus and batches of *Aedes aegypti* fed daily on each monkey and specimens of blood injected into other animals. By mosquito transmission experiments the virus was found to be present in the peripheral blood of these five monkeys within one or two days after having been inoculated, which is also one or two days before the appearance of any febrile symptoms. In one instance mosquitoes became infected by feeding on the blood of a monkey inoculated only 12 hours previously. The blood of all five monkeys was found to be continuously infective during the febrile period and for one day afterwards, whether tested by

mosquitoes or by direct inoculation into other animals. Later the virus seemed to disappear from the blood.

In an interesting discussion of their results, the authors consider the course of experimental yellow fever in monkeys. For practical purposes fever was taken as 104° F. or more, occurring after the usual incubation period, and out of 606 monkeys that died of yellow fever, only 3·8 per cent. failed to reach this arbitrary limit, and of these 1 per cent. showed no registered rise. When death was delayed until the sixth, eighth and tenth days, the blood gave somewhat variable results in the last stages of the disease. In three out of the five monkeys, on the last day of infectivity, the inoculation of small quantities of their blood into normal monkeys produced fatal infections, whilst the inoculation of larger quantities of blood did not produce death. In one instance the blood collected before the final rise in temperature did not cause death, but on the two following days produced fatal infections, suggesting possibly a re-invasion of virus into the circulation.

With reference to treatment the authors point out that in monkeys killed on the first day of fever, tissue damage has already occurred, such as marked fatty degeneration of the liver and sometimes of the heart, and death of the liver cells. The results of the mosquito transmission experiments suggest that when insects are fed on monkeys at the height of the fever they become infective rather sooner than when fed on infected monkeys either before or after the febrile period. The animals inoculated with blood-virus showed a more rapidly fatal course of the disease than those infected by the bites of mosquitoes. The results of these experiments in general suggest that if the virus content of tissues corresponds with that of the blood, the optimum time for the preparation of vaccine is during the febrile period. If serum-virus is used for making vaccine, which, according to unpublished results of KLOTZ and HUDSON, has been found experimentally effective, blood drawn during fever is certainly preferable.

[KUCZYNSKI and HOHENADEL (see this *Bulletin*, Vol. 27, p. 86) previously showed that the virus appeared in the circulating blood of infected monkeys very soon after inoculation, and in one instance produced infection with the blood of a monkey collected only 8 minutes after it had been inoculated with infected blood. The fact that the blood of yellow fever patients is infective to mosquitoes before the appearance of any clinical symptoms is of considerable importance from the point of view of instituting methods of control during yellow fever outbreaks.]

E. H.

SELLARDS (Andrew Watson). **The Cultivation of *Treponemata* from the Blood of Normal Monkeys (*Macacus rhesus*) and from the Blood of Monkeys infected with Yellow Fever.**—*Proc. Nat. Acad. Sci.* 1930. Mar. Vol. 16. No. 3. pp. 222–228. [4 refs.] [Harvard Med. School, Boston.]

The author incubated the blood of 26 monkeys (*Macacus rhesus*) infected with a French strain of yellow fever, and in the blood of 9 monkeys obtained a fairly luxuriant growth of ordinary spirochaetes. Control cultures were made from 22 normal monkeys and in one instance a small spirochaete was isolated with a length of about 2 to 4 microns. The inoculation of this organism into monkeys produced

no reaction. [This organism seems to resemble "*Vibrio macaci*" found by KUCZYNSKI & HOHENADEL in cultures of organs from *Macacus rhesus*, see this *Bulletin*, Vol. 26, p. 296.]

The spirochaetes obtained from yellow fever monkeys showed marked variation in their morphology, some resembling those from normal animals. The most common forms were about 3 to $3\frac{1}{2}$ microns in length with 2 to $2\frac{1}{2}$ coils, and when cultivated at 37° C. frequently broke up into a mass of granules resembling some of the forms seen in mosquitoes. Some of the strains when inoculated into monkeys produced a rapidly fatal intoxication, with jaundice and gastric haemorrhages and a fatty liver. The livers did not show the widespread necrosis of yellow fever, but in some instances there was extensive fatty infiltration and in one case inclusion bodies were observed.

The most curious result is the apparent production of partial immunization by the inoculation of these cultures. Seven monkeys were inoculated with small doses, and five were subsequently infected and died of yellow fever and the remaining two succumbed to larger doses of the culture.

Subsequently the monkeys were first rendered immune to large doses of the cultures by means of repeated inoculations. Two monkeys thus treated were inoculated with a virulent strain of yellow fever and both survived, though one showed fever for one day; five controls all died.

Subsequently two other monkeys were immunized with a strain after passage through 13 subcultures, and subsequently inoculated with yellow fever virus. One died of yellow fever on the 30th day, whilst the other remained alive and well. One monkey was immunized against the spirochaete from normal monkeys as a control and another against a strain from a yellow fever one. Subsequently these animals were bled and 3 cc. of the serum of each mixed with virulent blood and inoculated into two normal monkeys. The one inoculated with virus and control serum died of yellow fever on the 5th day, whilst the other showed an abortive reaction and recovered.

The name "*Treponema xanthogenes*" is proposed for the organism, the nature of which requires much further investigation.

[It seems possible that these various strains of spirochaetes obtained by the author may have been derived from the alimentary canal, and the pathological conditions associated with yellow fever might quite easily favour their entry of the blood. Similar invasion of the blood by spirilliform organisms has been described by SANARELLI in the case of *Heliconema vincenti* in guineapigs [see this *Bulletin*, Vol. 24, p. 698; Vol. 25, p. 95]. The aetiological significance of "*Tr. xanthogenes*" is very difficult of interpretation, but the reviewer would draw attention to the fact that yellow fever virus withstands prolonged desiccation, whilst, so far as is known, all spirochaetes are immediately killed by drying.]

E. H.

SELLARDS (Andrew Watson). **Observations on Yellow Fever.**—*Southern Med. Jl.* 1930. Feb. Vol. 23. No. 2. pp. 121–124. [5 refs.] [Harvard Med. School, Boston.]

The author gives particulars of experiments with a Senegal strain of yellow fever [see this *Bulletin*, Vol. 25, p. 539]. The virus was found to be extremely virulent for monkeys and death might occur in 4 days

after inoculation, but more commonly in 5 to 7 days. In one instance a monkey died 26 days after injection.

Frozen blood was found to retain its virulence for very long periods, and in one instance 4 cc., that had been kept at about -7°C . for six months, when inoculated intraperitoneally, killed a monkey in six days. Infected liver in one instance preserved its virulence for about 12 weeks at -7°C ., after which the virulence diminished and monkeys injected after 16 and 20 weeks remained well. However, when subsequently injected with virus these animals developed fever, but recovered.

Necrosis of the liver was found to come late in the disease, for animals killed 24 to 36 hours before death was expected showed fatty infiltration and sometimes degeneration of the liver cells, but no necrosis.

Infected mosquitoes were carefully examined for *Rickettsia* and other organisms; but with negative results. In a small proportion masses of *Rickettsia*-like micro-organisms were found in the stomach, but not with the constancy and regularity that they are seen in lice and ticks infected with *Rickettsia*.

A monkey inoculated with the legs, containing coelomic fluid, of 7 infected mosquitoes was neither infected nor immunized, nor was a second monkey inoculated with coelomic fluid collected by means of a pipette from the thorax of 4 infected mosquitoes. As a control the tips of the abdomen were cut off these mosquitoes and inoculated into a monkey, which died of yellow fever.

In one experiment 2 mosquitoes of an infected lot produced a fatal infection, but another 8 mosquitoes of the same lot, when fed on an immune monkey, failed to produce infection when fed on a normal monkey seven days later. [DINGER and his colleagues obtained the opposite results, see this *Bulletin*, Vol. 26, p. 1006.]

The virus was found to be capable of living in guineapigs. One guineapig was inoculated with 4 cc. of brain emulsion from a yellow fever monkey; one week later its spleen together with some blood was inoculated into a second guineapig; after 5 days a similar injection was made from the second to a third guineapig. All the animals remained well, showed no rise in temperature and showed no lesions at autopsy. Five days after being inoculated the blood and spleen of the third guineapig were injected into a monkey which died of yellow fever in less than 3 days. A repetition of the experiment gave negative results. In another experiment 2 guineapigs were inoculated with the same dose of virus (3.5 cc. of infected blood) and a week later half of the spleen and 4 cc. of blood from each of these animals inoculated into 2 monkeys. One showed a typical attack of yellow fever, whilst the other remained well and susceptible.

The fluid from the anterior chamber of the eye and also the cerebrospinal fluid of infected monkeys were found to contain the virus, and produce fatal infections when inoculated into normal monkeys.

E. H.

DA CUNHA (Aristides Marques) & MUNIZ (Julio). **Note about Experimental Yellow Fever.**—*Inst. Oswaldo Cruz, Suplemento das Memorias*. 1929. Jan. & Feb. No. 5. pp. 17-18.

The authors give some observations on the course of yellow fever in monkeys. They used a Brazilian strain isolated by them and also an African strain [presumably the "Asibi" strain]. The African strain

was found to be invariably fatal to monkeys 4 to 6 days after inoculation, but the Brazilian strain gave varying results, sometimes causing the rapid death of the animal, at others producing chronic infections with death after intervals ranging in one instance up to 36 days, and finally in some monkeys producing no signs of the disease.

The livers of monkeys infected with the Brazilian virus showed considerable variations in the extent of the necrotic lesions. In some there was extensive necrosis with destruction of the greater part of the hepatic cells; others showed no necrosis but only intranuclear changes; whilst in one monkey no histo-pathological changes could be found, although the animal was proved to contain yellow fever virus. On the other hand, monkeys infected with the African strain were always found to show extensive lesions in the liver.

E. H.

MONTEIRO (J. Lemos). Notas e observações sobre a febre amarella experimental. Comunicação feita á 4a conferencia sul-americana de microbiologia, pathologia e hygiene. [**Notes on Experimental Yellow Fever.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 141–150. With 6 figs. on 3 plates. English summary facing p. 150. [Butantan Inst., São Paulo.]

Virus of the African (Asibi) strain after infecting a *M. rhesus* was treated with formol and phenol and kept in the ice-chest for six days. When injected into other *rhesus* death resulted without any preceding febrile reaction. An emulsion of the liver of this animal when injected into another *rhesus* caused death after fever, and the signs of yellow fever post-mortem were typical. The first virus was clearly attenuated in that it set up an afebrile infection.

Another mode of preparing a vaccine is detailed. The liver and spleen are taken and placed in 5 per cent. phenol for 15 minutes, then washed at least twice in normal saline, cut into small pieces and triturated with sand. Five times the weight of normal saline is added and an emulsion made, filtered through four layers of gauze and placed in a flask with addition of 1 per cent. chloroform; it is well shaken for two hours and then placed overnight in an ice-chest; the following day it is again shaken, filtered, and distributed in 2 cc. ampoules. Tests with this are not yet completed.

H. Harold Scott.

FROBISHER, Jr. (Martin). **Properties of Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 300–320. [30 refs.]

The authors used four strains of yellow fever, two African and two Brazilian, for the study of the properties of the virus. Cultures were made on various media and 13 strains of bacteria isolated from the blood or liver of infected monkeys. Attempts to find *Leptospira icteroides* both by culture and inoculation into guineapigs were negative. Out of 15 guineapigs inoculated with infected human blood, 8 showed rises in temperature, but cultures and also subinoculations into other guineapigs and a monkey gave negative results. [It is possible that these animals may have been infected with yellow fever.]

An attempt to adsorb the virus by *Bacillus cereus* gave negative results. The action of various disinfectants showed that the virus was not inactivated by exposure at 30° C. for 30 minutes to the following substances, which would ordinarily prove bactericidal under these conditions: Mercuric chloride, 1 in 7,500; phenol, 1 in 150; hexyl-

resorcinol, 1 in 1,500; sodium oleate, 1 in 150. The virus was inactivated though not necessarily killed by similar exposure to the following: Eosin (yellowish), 1 in 300; ethyl alcohol, 1 in 6; formalin, 1 in 15; sodium oleate, 1 in 50; liquor cresolis compositus, 1 in 200. Serum virus was completely inactivated when heated at 60° C. for 10 minutes; but heating at 55° C. for a similar period may or may not inactivate the virus. Temperatures below 55° C. for 10 minutes cannot be relied upon to have any effect. Dried blood virus heated at 60° C. for 10 minutes produced yellow fever in a monkey after an incubation period of 17 days and the animal died after 22 days. A monkey was injected repeatedly with a total of 153 cc. of infected serum inactivated by heating at 60° C. for 20 minutes. Although the serum of this monkey failed to protect other monkeys against the disease, the animal itself resisted a fatal dose of highly infectious serum. Experiments to determine the electrical charge were inconclusive. No satisfactory precipitin reactions could be found between yellow fever sera and various antigens, such as urine from infected monkeys, alcoholic extracts of the livers and hearts of infected monkeys, and an aqueous extract of infected liver. Seven strains of proteus bacilli were tested in the effort to find a non-specific agglutination phenomenon, but yellow fever immune sera failed to agglutinate any of these organisms. Moreover, no significant skin reactions could be demonstrated by the intracutaneous injection of various yellow fever sera, tissue extract, and fresh virus blood, into sick, recovered and normal monkeys.

E. H.

SAWYER (W. A.) & FROBISHER, Jr. (Martin). **The Filtrability of Yellow Fever Virus as existing in the Mosquito.**—*Jl. Experim. Med.* 1929. Dec. 1. Vol. 50. No. 6. pp. 713-718. [5 refs.] [Internat. Health Division, Rockefeller Foundation, New York.]

It may be recalled that STOKES, BAUER & HUDSON [see this *Bulletin*, Vol. 25, p. 537] found that the yellow fever virus in the mosquito suspended in salt solution would not pass through Berkefeld filters V and N. The present authors confirm this observation, but have made the interesting discovery that if the infected mosquitoes are ground up with monkey serum diluted with half its volume of normal saline solution, the virus will then pass through these filters. The same results were obtained with mosquitoes ground up during the so-called incubation period, from which it is evident that the virus of yellow fever as it exists in the mosquito behaves with regard to filtration through Berkefeld N filters in the same way as the virus in the blood of infected monkeys.

E. H.

GOMES (Luiz Salles). Pesquisas em torno de alguns casos de febre amarela. These apresentada á 4a conferencia sul-americana de microbiologia, pathologia e hygiene—Julho de 1929. [**Research on a Series of Cases of Yellow Fever.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 151-165. [8 refs.] English summary facing p. 164. Also in *Ann. Paulist. Med. e Cirurg.* 1930. Jan. Vol. 21. No. 1. pp. 6-16. [8 refs.]

Two of the three researches spoken of in this paper have already been mentioned in the *Bulletin*. The first was to prove once again

the absence of *Leptospira icteroides*, a fact now generally taken for granted. The second confirmed the "Costa Cruz reaction," the reduction of complement in serum of yellow fever patients. This, even in mild cases, is much reduced and in fatal cases is absent altogether. The third was a determination of blood-sugar by the method of Folin and Wu. In a convalescent patient the amount was 0.0670 gm. per cent., in others at different stages of the disease it was lessened, on the second to third day to 0.046, on the fourth 0.009 to 0.002, on the sixth to 0.008 gm. per cent. In general terms there is a distinct hypoglycaemia from the fourth to seventh days of disease.

H. Harold Scott.

ARAGÃO (Henrique de Beaurepaire). Modernas aquisições sobre a febre amarela experimental. [**Modern Achievements in Experimental Yellow Fever.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 5-22. [34 refs.] English summary facing p. 22. [Oswaldo Cruz Inst., Rio de Janeiro.]

This article is a summary of the work which has been recorded on the subject of yellow fever during the past two years: the species of monkeys susceptible, the mosquitoes capable of acting as vectors, the search for a causative organism, attempts to devise a sure serological means of diagnosis and the manufacture of a protective vaccine. All these have already received notice in the *Bulletin*. The author gives some more details of vaccine prepared from the organs with formalin and phenol. It has been used for 25,000 persons, susceptible new arrivals chiefly. Among these about one per 1,000 has later become infected, and it is inferred that the dose employed was too small. Consequently of late the vaccine has been concentrated and the dose increased, but it is too early to express an opinion on this at present.

H. Harold Scott.

PARREIRAS (Decio). Algumas observações sobre a vaccina anti-amarillica de Aragão. [**Remarks on Aragão's Yellow Fever Vaccine.**]—*Sciencia Med.* 1929. Aug. Vol. 7. No. 8. pp. 395-397.

ARAGÃO's modification of Hindle's vaccine, an emulsion in formol and carbolic solution of the liver, spleen, kidneys and brain of an infected *M. rhesus*, was tried in Nilopolis and other places in Brazil. A dose of 2 cc. was injected subcutaneously in 182 subjects. Two only of them contracted the disease within 45 and 180 days of vaccination; both were severe infections and one patient died.

H. Harold Scott.

HINDLE (Edward). **The Duration of Yellow Fever Immunity.**—*Lancet*. 1930. Mar. 1. p. 451. [2 refs.] [Wellcome Bureau of Scient. Research, London.]

In order to test the duration of immunity against yellow fever, the blood of a patient who suffered from a severe attack of the disease in Brazil more than 24 years previously was collected, mixed with virus and inoculated into monkeys. One rhesus monkey received a mixture

of 4 cc. of citrated blood of the patient, 0.05 gm. of infected liver and 0.5 cc. of blood from another infected monkey collected on the second day of the fever. A second rhesus monkey was inoculated with 1 cc. of the patient's blood and 0.05 gm. of infected liver. Neither of these monkeys showed any rise in temperature nor other signs of the disease, whilst a control animal inoculated with the infected liver used in the experiment died in 4½ days. The liver came from a monkey infected with an African strain, whilst the infected blood contained a Brazilian strain of the virus; therefore the results furnish additional evidence in support of the identity of the West African and Brazilian strains of the disease.

These results confirm the generally accepted view that recovery from yellow fever is followed by a lasting immunity, for in this case the patient had never been exposed to infection since his attack in 1905, yet his blood was still capable of producing passive immunity in monkeys.

E. H.

MONTEIRO (Lemos). Contribuição ao estudo da flora microbiana na febre amarella e suas relações imunológicas com a infecção humana e experimental—sobre a possibilidade de um diagnostico bacteriologico da febre amarella. Comunicação feita á 4a conferencia sul-americana de microbiologia, pathologia e hygiene. [**Contribution to the Study of the Bacterial Flora in Yellow Fever and the Immunological Reactions in Human and Experimental Infections—regarding the Possibility of a Bacteriologic Diagnosis of Yellow Fever.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 197–242. With 2 plates. English summary facing p. 243.

The author isolated various organisms from the tissues of patients dead of yellow fever and from those of animals experimentally infected. These were notably *Corynebacteria*, the chief of which is designated FH4. Though not regarded as causative this was agglutinated by the sera of patients up to a titre of 1:160, if the culture is fresh, and it is suggested that this reaction may be of service in diagnosis on lines similar to that of *Proteus* X19 in typhus.

H. Harold Scott.

BOYÉ. La fièvre jaune en Afrique Occidentale Française au cours de l'année 1928. [**Yellow Fever in French West Africa during the Year 1928.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 280–281.

During 1928 only 6 cases of the disease were recorded from the French colonies, 3 isolated cases in the Ivory Coast and another 3 isolated cases in Dahomey. All except one were fatal.

E. H.

BUCHANAN (George S.). La fièvre jaune dans l'Afrique Occidentale Anglaise. [**Yellow Fever in British West Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 277–279. [2 refs.]

During the year 1929 only 5 cases of yellow fever, of which 3 were fatal, have been recorded from British West Africa. These all occurred at Bathurst in the Gambia.

E. H.

SELWYN-CLARKE (P. S.). **Report on the Yellow Fever Conference at Dakar, 1928. No. VII of 1929-30. Gold Coast.**—38 pp. With 9 plates. 1929. Govt. Printing Office, Accra, and Crown Agents for the Colonies, 4 Millbank, S.W.1. [2s.]

An account of the yellow fever conference at Dakar, 1928, the report of which has already been reviewed in this *Bulletin*, Vol. 26, p. 602. Incidentally, the writer mentions that Dr. MATHIS reported having found *Leptospira icterohaemorrhagiae* in the rodents at Dakar, which seems to be the first time it has been recorded from West Africa, although previously BLANCHARD, LEFROU & LAIGRET [see this *Bulletin*, Vol. 20, p. 582] found an organism closely resembling this spirochaete in patients suffering from febrile jaundice in the French Congo.

E. H.

SEIDELIN (Harald). **Yellow Fever.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. p. 211.

HINDLE (Edward). **Yellow Fever.** [Correspondence.]—*Ibid.* Nov. 25. No. 3. pp. 321-322. [4 refs.]

The first letter calls attention to the fact that several dogmatic statements on yellow fever problems had been made on insufficient evidence. In particular, the belief that the virus is present in the blood of patients during the first three days only of the disease, seems to have little foundation and the writer asks for further information on this question.

In the reply, a brief summary is given of recent experiments supporting the earlier view that, as far as human patients are concerned, the virus generally disappears from the blood within three days of the onset of fever, and therefore when any attempt is being made to infect monkey from cases of yellow fever, the blood should be collected as soon as possible after the beginning of fever, preferably on the first day. This does not necessarily imply that the blood is infective for only three days, as the virus may be present in the circulation before any signs of the disease can be detected. As a result of the early disappearance of virus there seems to be little danger of acquiring the infection when performing autopsies on human yellow fever cases, and up to the present there is no record of the disease having been acquired in this manner. On the other hand, since the discovery of the susceptibility of monkeys, in which the virus is present at death, there have been at least ten cases of laboratory infection, which is a sufficient indication of the highly infectious nature of the virus.

E. H.

ROUBAUD (E.). *Recherches biologiques sur le moustique de la fièvre jaune, Aedes argenteus* Poiret. Facteurs d'inertie et influences réactivantes du développement. Les oeufs durables et leur importance dans le rajeunissement du cycle évolutif. [**Biological Studies on the Yellow Fever Mosquito. Factors of Inertia and Reactivating Effects on Development. Resistant Eggs and their Importance in restarting the Development Cycle.**]—*Ann. Inst. Pasteur.* 1929. Sept. Vol. 43. No. 9. pp. 1093-1209. With 21 text figs. [33 refs.]

It is impossible in the space available to do justice to the extensive series of observations contained in this memoir, which in addition to its

general biological interest, also contains much valuable information on the bionomics of this important mosquito.

The first part is devoted to an account of the peculiarities of egg laying and their subsequent hatching. The female seems to be guided by certain tropisms in choosing a site for laying her eggs and invariably selects water containing decomposing material in preference to pure water. Floating wood is often selected, if its surface is decomposing, in which case the eggs are laid on the wood instead of on the surface of the water. The eggs laid, although morphologically identical, are of two kinds, one *active* which hatch in two or three days, whilst the other kind are *inactive* and remain dormant for considerable periods. Out of three females carefully examined, the eggs laid by the first contained 60 per cent. active eggs; the second, 70 per cent. active; whilst the third laid only inactive eggs. By means of mechanical stimulation, such as shaking, it is possible to make both kinds of eggs hatch rapidly, but some of the inactive eggs may require yet further stimulation. Consequently there is no sharp distinction between the two types of eggs, but rather a gradation from those hatching readily to those requiring a very long period of quiescence, or repeated artificial stimulation. In the absence of such stimulation these inactive eggs may remain alive without any obvious development for many months up to a maximum of just over a year, but six to eight months is an average duration. They will also live dried on filter paper for three or four months, a useful property in sending them by post. Many physical and chemical excitants will cause these dormant eggs to hatch. In general, prolonged exposure to cold or prolonged drying render the eggs ready to hatch, but short exposures have comparatively little effect. This, of course, corresponds with the conditions met with in nature, when these eggs help the insect to survive through periods of drought or cold.

A large number of chemicals have been tested in the past, and the author only gives the results of tests with ether, various oxidizing agents such as potassium permanganate, and sodium hypochlorite. These three were all found to produce hatching, but the latter is said to be preferable to any other substance for revealing the presence of living larvae. The eggs to be tested are placed in 1 per 1,000 sodium hypochlorite, and if any contain larvae they will generally be found to hatch within 24 hours. It must be noted that the larvae after hatching are killed by the fluid, so it can only be used as a test. Finally these eggs hatch in the presence of ferments, such as diastases, secreted by micro-organisms in water containing decomposing matter. Pepsin, trypsin, and papaine were all found to be as effective as cultures of micro-organisms.

A study of the females showed that some lay their eggs after only one feed of blood, whilst others require two, three or four meals before laying. The differences in egg laying are correlated with metabolic differences in the females. When the larval development is very slow the resulting females are generally of the sluggish type, possibly as a result of toxic conditions in the medium. When the larvae are very crowded there is a considerable slowing of development as a result of the effects of toxic substances produced in the water. When larvae are exposed to the action of such water, even in small numbers, a secondary diapause, or stoppage in development, is produced, accompanied by a diminution in the number of females produced and eventually by their suppression. This effect was also produced by adding ammonium carbonate in the proportion of 1 : 10,000 to the water containing larvae.

When females have developed at temperatures below 20° C. they do not show these physiological defects. On the contrary, some females kept at 25–30° C. ceased laying, but when exposed to 16–18° C. for 10 days recovered their fecundity.

Causes of the production of resistant eggs are next discussed, and the conclusion reached that these are eggs containing an excess of toxic material derived from the parent. These toxic substances cause a stoppage in the post-embryonic development, or *asthenobiosis* of the first larval stage. In addition to the diapause thus produced at this stage of development by inherited effects, a secondary diapause may appear during later larval stages as a result of unfavourable external conditions.

The metagenic reactivation of the resistant eggs is next considered and the various methods of producing the hatching of larvae discussed in detail. Finally, the author discusses the practical bearing of these results and the great importance of these resistant eggs, as they enable the mosquito to withstand ordinary anti-larval measures. In order to ensure the hatching of these eggs, it is recommended that commercial sodium hypochlorite solution containing 90 gm. of chlorine per litre should be added to the water in the proportion of 1 part per 1,000. This should be done during the dry season when fewer breeding places have to be dealt with. The presence of such eggs, however, shows that the systematic treatment of breeding places has to be carried out with very great care in order to ensure the destruction of all development stages of the mosquito.

E. H.

SAUTET (Jacques). A propos de l'emploi des hypochlorites dans la lutte contre la fièvre jaune. [**Concerning the Use of Hypochlorites in the Fight against Yellow Fever.**—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 202–204. [2 refs.]

An account of experiments on the use of hypochlorites for the destruction of yellow fever mosquitoes [see above.] When Eau de Javel* was added to distilled water containing eggs of *Aedes*, it was found to have a very unfavourable action so long as the temperature did not exceed 25° C.; at 37° C. the larvae hatched almost at once and then died. In contaminated water, on the other hand, the Eau de Javel, although having an unfavourable action at low temperatures, at 25° C. allowed the development of the larvae to proceed in the same way as in ordinary water. At 37° C. the hatching of the eggs was instantaneous in the chlorinated water, but did not occur in pure water. The author is of the opinion therefore that for destroying mosquito larvae hypochlorites are of no use in tropical countries as they merely stimulate the development of the eggs; and in temperate countries their use is unnecessary.

E. H.

DE OLIVEIRA (Waldomiro). Prophylaxia da febre amarella no estado de São Paulo, Brasil—Julho de 1929. [**Yellow Fever Control in the State of São Paulo, Brazil**—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 37–117. With 5 plates (2 maps) & 8 charts. English summary facing p. 116.

The first case of the recent outbreak of yellow fever seen in São Paulo occurred early in 1928 and measures were immediately

* Solution of chlorinated potash or soda.

adopted to deal with it. The districts were divided into sectors and careful inspection made to discover any foci of *Aedes*. These were then promptly dealt with. Places where cases occurred were visited, but segregation of suspects was not carried out, as this measure would be of little value in the absence of any certain means of early diagnosis. Public lectures and demonstrations with cinema films were given. The Port of Santos has thus been kept free from the disease and São Paulo has consequently not suffered.

H. Harold Scott.

ИЧОК (G.). Les problèmes actuels de la fièvre jaune. [**The Present Problems of Yellow Fever.**]—*Rev. d' Hyg. et de Méd. Préventive*. 1929. Dec. Vol. 51. No. 12. pp. 918-931.

A general account with special reference to prophylaxis of the conclusions of the yellow fever conference held at Dakar in April, 1928.

E. H.

REGIS (L. J.). La fièvre jaune. Etat actuel de la question. [**Yellow Fever. The Present State of the Problem.**]—*Marseille Méd.* 1929. Sept. 15. Vol. 66. No. 26. pp. 313-341.

A surprisingly erroneous compilation apparently written under the impression that Noguchi's "*Leptospira icteroides*" is the causative organism of yellow fever.

E. H.

LE GAC (P.). L'excitation amarile. [**Yellow Fever Excitation.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 743-746.

Calls attention to the extreme nervous symptoms that may be shown by yellow fever patients, which in some cases may be so severe as to be mistaken for delirium tremens or other forms of delirium.

E. H.

TROPICAL OPHTHALMOLOGY :

A REVIEW OF RECENT ARTICLES.—XIII.*

EYELIDS.—WRIGHT¹ has drawn attention to the value of Webster's operation for entropion and trichiasis (*vide* MACRAE, *British Journal of Ophthalmology*, 1928. Vol. 12. p. 25). In this operation an incision is made through the entire thickness of the tarsal plate on the conjunctival surface of the lid; the wound is placed at a distance of 3 mm. from the border of the lid and is parallel to it. The tarsal plate is completely divided into an upper and a lower portion. The incision approaches either extremity of the lid margin, but does not quite reach it. A strip of mucous membrane, taken from the lip, is then grafted into the wound. Before the graft is placed in position all fat is removed from its deep surface and its extremities are shaped so that the strip of tissue lies properly in place. No sutures are required.

CONJUNCTIVA.—CHESNEAU² has investigated the forms of infectious conjunctivitis met with in Cammon. 41 per cent. of the infections were due to the Morax Axenfeld bacillus, 29 per cent. to the Koch-Weeks, and the two infections were associated in 11 per cent. Pfeiffer's bacillus was met with in 6 per cent., the pneumococcus in 3 per cent. and the gonococcus in only 2 per cent. The Koch-Weeks inflammation is usually of a mild type, and the hot season exercises a marked influence upon the occurrence of epidemics of this disease and of diplobacillary conjunctivitis. The author describes three cases of conjunctivitis accompanied by chemosis, miosis and haemorrhage beneath the bulbar conjunctiva. He attributed these attacks to the presence of ascarides and suggests that this parasite can cause a definite conjunctival inflammation.

Trachoma.—WARNER³ describes the prevalence of trachoma amongst the Indians in Arizona and in New Mexico. He thinks there is a considerable basis for a belief that the disease was introduced into the country by the early Spanish settlers. In 1912 as many as 39 per cent. of Indians were found to be infected in some districts. The active work of the Medical Service amongst the Indians has now resulted in a marked reduction in the incidence of the disease. He recommends that the practice of segregation of trachomatous children into special schools should be extended to include all the Indian country, and that the main effort against trachoma should be concentrated on the treatment of the infected children in these schools.

GUBBAY⁴ states that the majority of the patients attending the Indian clinic at Jammu, Kashmir, are suffering from trachoma or

* For the twelfth of this series see Vol. 27, pp. 22–30.

1 WRIGHT (R. E.). Webster's Operation for Entropion of the Upper Lid.—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. pp. 549–550.

2 CHESNEAU (Pierre). Les conjonctivites infectieuses au Cammon (province du Moyen-Laos).—*Ann. de Méd. et de Pharm. Colon.* 1929. July–Aug.–Sept. Vol. 27. No. 3. pp. 416–422.

3 WARNER (H. J.). Notes on the Results of Trachoma Work by the Indian Service in Arizona and New Mexico.—*Public Health Rep.* 1929. Nov. 29. Vol. 44. No. 48. pp. 2913–2920. [9 refs.]

4 GUBBAY (R.). Chaulmoogra Oil in the Treatment of Trachoma.—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. p. 563.

granular lids. He has found the application of chaulmoogra oil extremely satisfactory, and he now uses it almost to the exclusion of other remedies. The application may be made daily or on every alternate day if there is excessive irritation. About ten to fifteen applications are said to be sufficient. As might be expected, early cases are the most satisfactory to treat.

McHENRY⁶ has discussed the treatment of trachoma, and he stresses the importance of ensuring that the caruncle is free from infection. He uses as a routine a combination of grattage and expression, and first treats the bulbar conjunctiva, semilunar fold and caruncle. Anaesthesia is secured by cocainization and the injection of a 1 per cent. procaine hydrochloride solution beneath the bulbar conjunctiva, under the semilunar fold, and into the substance of the caruncle. Each individual trachoma follicle is punctured with a sharp Graefe knife and the contents then expressed with a small Prince forceps. The caruncle is pulled up between the blades of the forceps by gripping with an iris forceps. The conjunctiva of the lower lid is then treated in a similar fashion and is scrubbed with a toothbrush soaked in 1 : 1,000 mercuric chloride solution. The lining of the upper lid and fornix is then carefully treated in the same way. After an interval of ten or fifteen minutes, mercuric chloride, 1 : 500, is rubbed carefully and thoroughly into the lids with wool wound on a wooden applicator, the caruncle and bulbar conjunctiva being included. The sac is irrigated with sterile water or boric solution and filled with a 2 per cent. iodoform ointment. Blepharophimosis requires attention in most chronic cases, and a canthoplasty should precede other operative measures.

TRAMINI⁶ describes the benefit which followed the establishment of a small eye dispensary at El Kantara, on the borders of the Sahara. The dispensary only contains three rooms and a few simple instruments. In 1926, 2,389 patients were treated, 1,788 being trachomatous.

CASSIMATIS⁷ has drawn attention to the value of jequirity in the treatment of trachomatous pannus. The treatment was introduced by De Wecker in 1882 as a systematic measure. The intense reaction produced by it sometimes caused a destructive ulceration of the cornea. It is now possible to employ a product called jequiritol, which has a known strength. Four grades are used ; the first two produce only a feeble reaction, but the third and fourth cause an acute and very marked inflammation. If the inflammation becomes excessive it can be controlled by an anti-jequirity serum. Cassimatis found the mild grades of jequiritol effective in treating the small relapsing corneal ulcers which are common in the late stages of trachoma and other conjunctival diseases.

SALVATI⁸ has been much impressed by the beneficial action of tracolsyn in the treatment of trachoma. This drug is a combination of

⁵ McHENRY (D. D.). Practical Points in the Treatment of Trachoma.—*Jl. Amer. Med. Assoc.* 1929. Oct. 26. Vol. 93. No. 17. pp. 1291-1295. With 2 text figs. [7 refs.]

⁶ TRAMINI (J.). Le fonctionnement du dispensaire antiophtalmique d'El Kantara en 1925, 1926 et 1927.—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 496-500. With 1 text fig. [1 ref.]

⁷ CASSIMATIS (C.). Le jéquiritol dans le traitement du trachome et ses complications pannus et keratite recidivante.—*Jl. Egyptian Med. Assoc.* 1929. Oct. Vol. 12. No. 8. pp. 142-148.

⁸ SALVATI. Le traitement du trachome et ses complications par la tracolsine.—*Jl. Egyptian Med. Assoc.* 1929. Oct. Vol. 12. No. 8. pp. 155-158.

glycerophosphate and nucleinate of soda with some phenol. Half a cc. is injected beneath the conjunctival cul de sac. He has found that trachomatous follicles undergo absorption and the corneal complications soon disappear under the treatment. A maximum of thirty injections may be required.

The *Revue Internationale de Trachome* for October, 1929, contains an enthusiastic recommendation by A. MONBRUN⁹ of diathermy as a means of treating trachoma and its complications. He employs sterilized sewing needles for the application of the current and is particularly careful to avoid any prolonged application and always to bear in mind the fact that subsequent necrosis extends beyond the area of blanching. The treatment must not be used in the presence of secondary infections.

SÉDAN¹⁰ recognizes that the subconjunctival injection of strong solutions of cyanide of mercury in the treatment of persistent pannus may prove objectionable; but he has found weaker solutions of the drug to be more useful. He employs a strength of 1 in 5,000 combined with acoin. A very fine needle is used and two points of entry are made, one at each extremity of the horizontal meridian of the cornea. A circumlimbic injection, involving half the circumference of the cornea, is made during the withdrawal of the needle.

COLLIN¹¹ reports a case of recurrent conjunctival inflammation which occurred in a girl aged seventeen. The author considers it to have been true trachoma, although no source of infection could be traced. It is noteworthy that the patient was subject to a general lymphatism and had never menstruated.

CORNEA.—*Keratomalacia*.—VISWALINGAM and MARTIN¹² have made some observations regarding keratomalacia as it occurs in the Malay States. The patients usually belong to the Indian community. Night blindness is met with amongst adults, whilst keratomalacia is more often seen in children. Inunctions of gingelly oil were found useful, in addition to a diet of fresh milk, eggs, fruit and cod-liver oil. Martin found the calcium content of the blood to be lowered. Milk and liver extract appeared to raise this.

One often still sees it stated that keratomalacia does not occur in adults. Surgeons who have experience of the disease know, of course, that this is erroneous. KIRWAN¹³ has reported six cases of the disease which he met with in patients whose ages varied from twelve years to forty-five years. The diet deficiency in some of these patients had caused a urethral discharge which resembled gonorrhoea.

⁹ MONBRUN (A.). Le trachome et la diathermie chirurgicale. Méthodes, techniques et instrumentation pour la destruction des granulations conjonctivales, du pannus trachomateux et des follicules des cils trichiasiques.—*Rev. Internat. du Trachome*. 1929. Oct. Vol. 6. No. 4. pp. 145-164. [2 refs.]

¹⁰ SÉDAN (Jean). Sur le traitement des pannus rebelles injections sous-conjonctivales de cyanure de mercure.—*Rev. Internat. du Trachome*. 1929. Oct. Vol. 6. No. 4. pp. 165-169.

¹¹ COLLIN (L.). Un cas de trachome autochtone.—*Rev. Internat. du Trachome*. 1929. Oct. Vol. 6. No. 4. pp. 185-186.

¹² MARTIN (P. H.). Observations on Cases of Keratomalacia.—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 103-104. [1 ref.]

¹³ KIRWAN (E. W. O'G.). Keratomalacia in Adults.—Reported in *Brit. Med. Jl.* 1930. Mar. 1. pp. 389-390.

PILLAT¹⁴ (Arnold) also reports six cases of the disease which occurred in adults. He stresses the fact that the condition is primarily a "systemic disease which affects the greater part of the ectodermal structures—skin and its glands, hair, nails, and the epithelium of the respiratory and digestive tracks."

Cataract.—A paper¹ by ELLIOT¹⁵ on cataract extraction, though it relates primarily to European patients, contains many most valuable hints to those engaged in tropical practice. Regarding the question of maturity and of the time at which operation should be recommended, the author states "no patient should be allowed to go blind and to drop his normal activities. With modern methods of operating, any lens can be safely removed, however immature the cataract that darkens its vision. . . . When a patient reaches the stage in which he can no longer get about comfortably, or in which he cannot read, write, and carry on his usual occupations with moderate comfort, or cannot do either of these things, he should be operated on without delay." Perfect asepsis is, of course, essential when operating on an immature cataract. Elliot prefers to perform a preliminary iridectomy and to follow this a month later by extraction beneath a bridge flap of conjunctiva. [This technique is naturally less suitable in tropical practice. But after a little experience, it is quite easy to combine the operations and to perform an iridectomy beneath a conjunctival bridge if the flap is placed slightly to one side.] Glycosuria, provided the urine is free from acetone and diacetic acid, does not contraindicate operation. Leper patients usually do surprisingly well.

The "squeezing patient" is the bugbear of ophthalmic surgeons in general, but those who work amongst the more unsophisticated races are specially liable to encounter such difficult patients. Various measures from time to time have been devised to bring about a temporary loss of power of the orbicularis, the muscle whose violent contraction is the most pernicious, and thus to render an intraocular operation safer. O'BRIEN¹⁶ has found it quite a simple matter to induce a paresis of the temporo-facial division of the seventh cranial nerve by injecting 2 per cent. procaine hydrochloride solution into the tissues which surround the branch of the nerve as it crosses the condyle of the mandible. The point for injection is selected as follows: "The zygoma is located and the underside is followed backwards to a point just in front of and slightly below the external auditory meatus. The patient is then asked to open his mouth, and as he does this the condyle of the mandible is felt to slide forward. When the mouth is open, one notes a distinct depression under the finger tip. As the mouth is closed, the condyle is felt to slip back, and it is directly over this point and down on to it that the solution is to be injected." The needle should be pushed in until it strikes the bone. About 1 cc. of the anaesthetic solution is then injected and an additional 1 cc. is injected into the tissues during the withdrawal of the needle. Paresis is complete within five minutes.

¹⁴ PILLAT (Arnold). Does Keratomalacia exist in Adults?—*Arch. of Ophthalm.* 1929. Sept. & Oct. Vol. 2. Nos. 3 & 4. pp. 256-287; 399-415. With 21 figs. [53 refs.]

¹⁵ ELLIOT (R. H.). Some Points in Connexion with Cataract Extraction.—*Brit. Med. J.* 1929. Dec. 21. pp. 1147-1149.

¹⁶ O'BRIEN (C. S.). Akinesis during Cataract Extraction.—*Arch. of Ophthalm.* 1929. Apr. Vol. 1. No. 4. pp. 447-449. [5 refs.]

GENERAL DISEASES.—*Leprosy.*—HOFFMANN¹⁷ has found a choroiditis present in the eyes of a patient whom he believed to be a sufferer from leprosy in a latent form. He suggests that such a focal affection of the choroid does not represent a direct reaction of the tissues to the specific germ, but rather an allergic process, produced by the toxins of decaying Hansen bacilli in other parts of the body. And that in countries where leprosy is endemic this disease should be taken into consideration as a possible causal factor in those cases of choroiditis which would ordinarily be reckoned tuberculous although no definite tubercular infection was demonstrable.

Tularemia.—JUDD¹⁸ has reported two cases of tularemia of the conjunctiva. The first occurred in a woman aged 29 who, forty-eight hours after skinning some apparently healthy rabbits, developed an attack of fever. This was accompanied by an inflammation of the right eye and by swollen glands on the same side of her neck. The conjunctival lining of the lower lid showed six circumscribed ulcers with yellow necrotic centres. Constitutional symptoms persisted for a considerable period, but the eye lesion healed in the course of a few days. The second was a man aged 42, inoculated by having sustained a scratch on a finger from a bone of a rabbit he was dressing. Constitutional symptoms appeared four days later. His left eye developed a dendritic corneal ulcer with mild iritis, but glandular enlargement was absent. Agglutination tests were positive for *B. tularensis* in both cases.

MISCELLANEOUS.—KIRWAN¹⁹ thinks that in Bengal a large proportion of cases of chronic cyclitis, episcleritis, primary and secondary glaucoma, choroiditis and optic atrophy are associated with *intestinal infections* by protozoa and flagellates, and such are nearly always accompanied by a chronic colitis. Other sources of infection in these patients cannot be detected. The benefit obtained from suitable treatment suggests that the significance of such an association may be important.

ROUSSEAU²⁰ has given an account of the ophthalmic hospitals in Indo-China. In Tonkin and Annam there are hospitals which will accommodate from fifty to a hundred patients. In these districts trachoma is the principal incapacitating disease and is responsible for nearly 40 per cent. of blindness. Cataract occurs about five times as commonly as glaucoma. In Cochinchina the chief institutions are at Saigon and Cholon. Gonorrheal ophthalmia is rife in these places, and is a frequent cause of blindness. Trachoma is said to affect between 20 and 25 per cent. of the native population. This is rather a lower rate than in Annam and Tonkin, where it reaches between 40 and 60 per cent. In this part of the world purulent conjunctivitis is evidently very common and with trachoma occasions a loss of sight relatively very great.

¹⁷ HOFFMANN (W. H.). Choroiditis in Latent Disease.—*Jl. Trop. Med. & Hyg.* 1929. Nov. 15. Vol. 32. No. 22. pp. 328-330. [4 refs.] [Finlay Inst., Havana, Cuba.]

¹⁸ JUDD (J. Hewitt). Ocular Lesions in Tularemia. Report of Two Cases.—*Arch. of Ophthalm.* 1929. Sept. Vol. 2. No. 3. pp. 300-304. [12 refs.]

¹⁹ KIRWAN (E. W. O'G.). Abdominal Sepsis as a Cause of Eye Disease. [Correspondence].—*Brit. Med. Jl.* 1929. Sept. 28. p. 597.

²⁰ ROUSSEAU (Maurice). Les Instituts d'Ophthalmologie en Indochine.—*Rev. Prat. Malad. des Pays Chauds.* 1929. Sept. Year 8. Vol. 11. No. 9. pp. 416-418, 421-424, 427-430, 432-434.

HUISMAN²¹ was deputed by the Dutch Government to make an enquiry into the prevalence of blindness in the district near the mouth of the Tjitaroem river in Java, as rumours stated that this was excessive. Out of 942 persons examined, 4 suffered from active trachoma, 6 from cataract and 46 from other diseases. Only 2 persons were blind. He concluded, therefore, that the rumours were greatly exaggerated and that trachoma in particular was rare in the district.

REVIEWS.—The *National Medical Journal of China* has devoted its October number exclusively to a discussion of the diseases of the eye met with in China. This is an encouraging recognition of the essential part which a good knowledge of ophthalmology plays in rendering efficient the work of doctors practising in countries remote from western civilization. Several interesting and important papers have been contributed, and these furnish striking evidence of the progress made in China in the study of the subject. Professor Arnold PILLAT writes concerning the disasters which so often follow treatment by quacks and the use of irritant medicine by "wise women" and others—a familiar subject to those accustomed to Indian conditions. Acupuncture appears to be a favourite form of treatment, and septic wounds of the eyeball are a common consequence. Pseudo-ptyerygia, symblepharon and ectropion often result from excisions of a portion of the conjunctiva unnecessarily performed. The same writer describes an extension of the limbus on to the upper nasal quadrant of the cornea which is quite commonly seen in otherwise normal Chinese eyes. This condition, when the limbus becomes hypervascular in any simple form of conjunctival inflammation, might easily be confounded with a trachomatous pannus. C. H. CHOU reports some rare injuries of the cornea and furnishes an account of his findings in 312 lenses of Chinese patients examined with the slit-lamp. Coronary cataract was found in 46 per cent. of males and in 27 per cent. of females examined. PILLAT'S description of his experiences in a small military camp of 3,000 troops suggests that an adequate supply of cod-liver oil would prove little inferior to military tanks in improving the efficiency of the numerous Chinese armies in the field. 209 soldiers complained of eye trouble and 43 per cent. of these suffered from one of the various eye conditions associated with a deficiency of vitamin A. It is noteworthy that such signs of malnutrition were only observed amongst the rank and file. 99 per cent. of these are stated to have been suffering from trachoma!

The *Bulletin of the Ophthalmological Society of Egypt* for the year 1929 evidences the very healthy state of the Society by the number and quality of papers published by its members. Many of these concern trachoma and its complications, and the conjunctival inflammations so common in the country. The use of subconjunctival injections of phenolaine (1.5 cc. of a 0.4 per cent. solution) in the treatment of corneal nebulæ is referred to by WILSON and ANIN BEY. Both speak favourably of the treatment, but the former admits that the good results must be accepted with reserve as it is so difficult to eliminate other factors which might tend to aid absorption. RIAD describes the superficial keratitis which he found associated with dengue. BARRADA believes that both sympathetic ophthalmitis

²¹ HUISMAN (B.). Verslag van het oogonderzoek van de bevolking aan de monding van de Tjitaroem.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. Aug. 1. Vol. 69. No. 8. pp. 787-792. With 1 map in text.

and latent infection after trephining are rare in Egypt. ZAKI, on the other hand (p.77), considers that sympathetic ophthalmitis is common in the country, but that it often escapes diagnosis.

The Ophthalmological Laboratory at Giza is a Memorial to the men of the Egyptian Labour Corps and Camel Transport Corps who lost their lives when serving with the Allied Armies during the Great War. It is due to MACCALLAN's energy and enterprise that the Memorial took this very appropriate form, and a very fine laboratory for pathological study and research in connexion with diseases of the eye now commemorates the dead in their country where such disease is particularly rife. The third Annual Report for the year 1928 contains much information regarding its activities, with accounts of interesting cases seen. It is stated that the established ophthalmic hospitals have very largely reduced the amount of blindness in the country and that the reduction is steadily progressive. Also that "in Egypt the principal cause of blindness is undoubtedly gonococcal ophthalmia and not trachoma." Intramuscular injections of milk have been found to be a most valuable therapeutic agent in the treatment of gonococcal ophthalmia. Fresh cow's milk is boiled for three or four minutes and, after being allowed to cool to body temperature, it is skimmed. The dosage employed is 1 cc. of milk for each year of life [presumably up to a maximum of 10 cc.]. The injections appear to be made daily. WILSON furnishes an account of a follicular conjunctival inflammation produced in monkeys by an organism which resembles that described by NOGUCHI. He is not convinced, however, that the disease is true trachoma.

The 15th and 16th Annual Reports of the Ophthalmic Section, Department of Public Health, of the Egyptian Government for the years 1927 and 1928 are inspiring, and show how well maintained is the progress in the care of the sufferers from eye diseases in Egypt. The number of ophthalmic units in the country at the end of 1928 reached 41, of which 27 are permanent and 14 are travelling. New patients numbered 381,790, an increase of 10 per cent. The percentage of blindness amongst the general population is said to show a gradual fall during the past ten years. The gonococcus is the predominant cause of acute ophthalmia and is present in 39 per cent. of infections. A chart shows how closely a period of the hottest weather coincides with the maximum number of patients treated. It is noteworthy that the number of sufferers from primary glaucoma (4,683) nearly equalled that of those affected by senile cataract (4,767).

H. Kirkpatrick.

REVIEWS AND NOTICES.

GIGLIOLI (George) [M.D. (Italy), D.T.M. & H. (Eng.), Chief Medical Officer to the Demerara Bauxite Co., Ltd., British Guiana]. **Malarial Nephritis. Epidemiological and Clinical Notes on Malaria, Blackwater Fever, Albuminuria and Nephritis in the Interior of British Guiana, based on Seven Years' Continual Observation.**—pp. x+164. With 17 illustrations (1 map). 1930. London: J. & A. Churchill, 40, Gloucester Place, Portman Square. [8s. 6d.]

British Guiana extends from 1°–9° N. Lat. It has a rainfall of about 100 inches annually, somewhat less at Georgetown, and nearly half as much again in the mountainous districts, while in the far interior the rainfall is only about 50 inches. In the mountainous districts there are two rainy seasons, May to August and December to January, while in the far interior there is only one, May to September. The temperature is about 80° with a mean diurnal range of about 10°. British Guiana would seem to present unusually favourable conditions for the study of the epidemiology of malaria, for proceeding from the coast to the interior we pass through four zones in which the physical features are very different. Thus we have (1) the coastal zone of cultivated alluvium, in part below high water level, with a network of drains, dams and pumping stations. It is the populated zone containing eight-tenths of the population, which in 1927 was estimated at about 308,000; (2) the sand hill forest-covered zone: here the rivers are still tidal; (3) the mountain zone of valleys and rapids and falls, the zone that bars progress in the colony, and access to (4) the open savannahs, the rolling grassy plains of the far interior; these are reached on a journey of perhaps 100 miles.

Chapter I treats of the epidemiology in the interior of British Guiana, i.e., in the last three areas given above, the areas of the tidal rivers, of the flood and torrential rivers and of the savannahs. The author has had seven years' experience, and his results clearly indicate that a great amount of work still remains to be done in this almost unexplored territory in regard to malaria. His observations refer mainly, however, to the river districts of the interior. *A. argyritarsis* is the commonest anopheline and appears to be a carrier. It breeds from June to November and malaria appears to show a seasonal periodicity in relation to this. Its larvae occur in water, protected by overgrowth from direct exposure to the sun and disappear when jungle is cleared, though the water remains. Some details concerning malaria parasites are given in the table.

Malaria is defined as hyper-endemic in the tidal portions of the Guiana rivers. Thus on the Demerara river in 1926 OZZARD and the author found palpable spleens in nearly 100 per cent. of Boviander children under 15 years of age, and in 1926 a similar survey among Boviander and aboriginal Indian children gave a figure of 76 per cent. (The Bovianders are a mixed race containing European, South American Indian, and Negro blood.)

Part II is devoted to blackwater fever. In 1927, 19 deaths from blackwater fever were registered officially; this would indicate about 100 cases on a basis of a 20 per cent. mortality. The author in the interior has seen 56 cases (in 7 years?). The rise in the number of cases appears to follow the epidemic malaria rise in about 10 months (fig. 4). It is to be hoped that the chart can be continued so as to avoid a mere chance relationship.

An interesting feature is, that of his 56 cases, 33 occurred in children under 15. He gives five examples also of its occurrence in several members (nearly all children) of the same family. He suggests that this means either a house infection or a family idiosyncrasy. Among the 56 cases there were 9 deaths, a mortality of about 16 per cent. The disease occurred in individuals with a history of persistent relapsing practically-untreated

malaria of many months' duration. The precipitating factors were exposure, chills, and alcohol. The influence of quinine in carrying on relapses in hospital was repeatedly noticed.

Part III is concerned with malarial albuminuria and nephritis. The author has studied 102 cases of subchronic or more commonly chronic dropsical or interstitial nephritis. He shows that the "endemic nephritis" of British Guiana is a preventable disease—it is, in fact, due to malaria, and in no case were other diseases beyond malaria in evidence. He emphasizes the influence of quartan as shown in the table in producing nephritis, but seems to have overlooked MACFIE's paper on this subject.* The following table summarizes some of the parasite findings in different conditions.

Disease.	Cases : Parasites Positive.	<i>P. vivax</i> per cent.	<i>P. falciparum</i> per cent.	<i>P. malariae</i> per cent.
Malaria ...	1,247	81.4	15.7	2.9
Blackwater ...	19	79	21	—
Nephritis ...	58†	68.9	1.7	29.3

† Omitting 4 cases of double infections.

The table shows that the parasites found in blackwater are in almost the same rates as in malaria with a slight bias towards *P. falciparum*, whereas in nephritis the influence of quartan is conspicuous.

The book, though short (164 pp.), is an interesting one, and will repay careful reading. The author is to be congratulated in making good use of the cases that came under his observation.

J. W. W. Stephens.

BANERJEE (Dhirendra Nath) [M.B. (Cal.), M.D. (Berlin), etc.]. **Text Book of Pathology including Bacteriology, Animal Parasitology, Laboratory Methods and Laboratory Diagnosis of Diseases.** Second Edition. Revised and Enlarged.—pp. xvi+646. With 305 illustrations & 9 coloured plates. 1929. Calcutta: The Medical Bureau, 199 Cornwallis Street. [Rs. 12.]

It is not an easy task to write a work on pathology to compass the special subjects of bacteriology, protozoology, animal parasitology, histology, cytology and immunity. More difficult still must it be to present these subjects in what must, we presume, be to some extent a foreign language to the author. Nor do we think that the task has been accomplished to the satisfaction, say, of the specialist. There are numerous misspellings, mistakes of expression, doubtful definitions and misstatements throughout the book. These could be eliminated from the next edition with the assistance of colleagues and fellow workers. With that criticism, we may come to the consideration of the main purpose of the book. Indian students have not, as a rule, the means to spend on expensive text books. In this work they have presented a comprehensive treatment of fundamental pathological subjects which are necessary to the clear understanding of medicine and at a very moderate price. It is printed on good paper and there are numerous illustrations. Some of the illustrations, especially the photomicrographs, are not good, but this is a fault which can be found with many books. Authors are very apt to use photographs of too low power to be worth reproducing. The illustrations are, as they

* MACFIE & INGRAM, *Ann. Trop. Med. & Parasit.*, 1917. Vol. 11, pp. 1-28. Briefly noticed in this *Bulletin*, 1917. Vol. 10, p. 154.

ought to be, drawn from Indian sources. It is a noticeable feature of many of these that they portray advanced conditions such as are seldom met with in Western countries. Some of these illustrations are of large scale, frozen sections of whole organs and so thin that they admit of the use of oil immersion lenses. These sections can only be a tribute to a highly specialized technique. It is generally considered a fine performance by a select few to obtain paraffin sections of whole organs with an order of thickness of 6 to 10 microns, while collodion sections are much thicker.

In the treatment of his subject the author has not by any means followed conventional lines. Some interesting chapters on the history and evolution of pathology, its mode of study and scope are introductory to the more detailed consideration of the various subjects. They stamp the work as one on a higher plane than a text book intended simply to meet the needs of examination. Nevertheless, it may be found necessary in the future to sacrifice some of the introductory matter in order to incorporate new and important facts.

W. F. Harvey.

RAY (Kumud Sankar). Some Problems of the Medical Profession in India. Compiled for the All-India Medical Association.—88 pp. Calcutta. The Indian Daily News Press.

ROY (B. C.). Presidential Speech at the All-India Medical Conference, Lahore.—10 pp. 1929. Dec. 27.

NAUTH (Bhola). All-India Medical Conference. Held at Lahore, 27th and 28th December 1929.—61 pp. 1929.

Resolutions passed at the All-India Medical Conference. Sixth Session, held at Lahore, 27th and 28th December, 1929.—7 pp.

The objects of the All-India Medical Association are : To protect the interests of its members; to protect the interests of national health, of medical education and research throughout the country. This is an excellent programme and we wish it success. Looking down the list of President, officers, and a fairly large council we meet with only one European name, and no Mohammedan name at all. The "Problems" contains an address by Sir Nilratan Sircar delivered in 1928 and another address of the same year by the then President, Dr. G. V. Deshmukh. In spite of noble aims there is throughout nearly all these documents a spirit of grievance and complaint, complaint against the ways of Government and especially against the "I.M.S." and its so-called privileges in civil employ. These, according to Resolution No. 3, "should be stopped at once, and I.M.S. and I.M.D. officers should be made to revert to the military side." Dr. Deshmukh writes : "the name of science and research is being degraded to suit the convenience and profit of the foreign medical agency in India." Col. Bhola Nauth does not altogether approve of things as they are, but his excellent address contains a paragraph which breathes a different spirit : "Without going into heroics as the British Medical Association has been doing over the glorious traditions of the I.M.S. and the good work which it has done in awakening a medical and sanitary conscience in India, it is sufficient to note that your gathering here to-day is an eloquent proof, if proof were needed, of the tribute of respect and gratefulness which the sons of India owe to the I.M.S." Another cause of complaint is the control permitted to the English General Medical Council. There is a general desire for an All-India Medical Council. A bill introduced to provide for such a Council was dropped. It has lately been revived and will no doubt be passed. A third complaint, with which we can sympathize, is against the proposed Research Institute at Dehra Dun and the abolition of the old and well-known Institute at Kasauli. The 6 lakhs required to build and prepare the Dehra Dun Institute will

take from the Indian Medical Research Association large sums which have up to now been given as grants to other institutions doing good work, as, for instance, the "Calcutta School of Tropical Medicine." It is also pointed out that Dehra Dun is far away from large towns which supply from their hospitals the clinical materials so necessary for medical research. Dr. B. C. Roy in his address gives some excellent advice to the members of the "A.I.M.A." and other Indian medical men.

J. H. Tull Walsh.

MATHESON (Robert) [Professor of Entomology, New York State College of Agriculture, Cornell University]. **A Handbook of the Mosquitoes of North America. Their Structure. How they live. How they carry Disease. How they may be studied. How they may be controlled. How they may be identified.**—pp. xvii+268. With 25 plates & 1 coloured frontispiece & 23 text figs. London : Baillière, Tindall & Cox, 7 & 8 Henrietta Street, Covent Garden, W.C. 2. [25s.]

Professor Matheson has written a general account of the mosquitoes of North America which will certainly be very useful in that continent. He deals in detail with the external anatomy of the adult insect, and of the larva ; very little appears to be known about the structural characters of the egg or the pupa. He proceeds to a general account of its biology and relation to human welfare. Chapters on control, with special reference to America, follow. More than half of the book deals with the systematics of the 120 species of mosquito occurring in the area which extends down to, but does not include, Mexico.

Apart from the value of the book to a worker in North America, I feel that any entomologist without particular knowledge of mosquitoes could use it and learn much from it. There are, for instance, a number of admirable line drawings showing details of the chaetotaxy and of the structure of the hypopygia of the males. With the book and a collection of named specimens, one could rapidly acquire a good knowledge of the diagnostic and systematic characters of the mosquitoes.

From the point of view of human welfare, two topics of considerable importance are discussed. The more obvious is malaria, which is not really grave except in a few places in the area under discussion. The more interesting topic is perhaps the breeding of mosquitoes in salt marshes. In temperate America, as in Europe, there are certain species of the genus *Aedes* which breed exclusively in salt marshes, and which are so numerous and so persistent in pursuit of man that they militate against comfort wherever they occur in numbers. They seriously interfere with the proper enjoyment of places which without them would be holiday resorts, and they invade cities in such numbers as to cause annoyance to the inhabitants.

We may congratulate the author on his useful piece of work, well illustrated and adequately printed.

P. A. Buxton.

DALRYMPLE-CHAMPNEYS (W.). Undulant Fever with Special Reference to Animal Sources of Infection and the Possibility of its Prevalence in England and Wales.—*Ministry of Health. Reports on Public Health & Med. Subjects. No. 56.* 78 pp. With 10 figs. (7 on 4 plates). [457 refs.] 1929. London : H.M.S.O. [1s. 6d.]

This report, which contains an exhaustive investigation of the subject involving extensive examination of the literature (no fewer than 457 articles and pamphlets have been consulted), has already been fully reviewed in the *Bulletin of Hygiene*. As the title suggests, special reference is made

to animal sources of infection and the possibility of further spread of the disease in England and Wales. An historical introduction is followed by a careful clinical description of varying types of the disease. The differential diagnosis is discussed with special reference to enteric fever, Hodgkin's disease and tuberculosis. Laboratory diagnosis is then dealt with, including blood culture and urine culture, animal inoculation and general bacteriological and serological methods. The vexed question of the relationship between *abortus* and *melitensis* is discussed in considerable detail and various tests which have been employed for differentiation are referred to. Human infection from animals other than goats is dealt with at considerable length, and the report concludes with a careful analysis of cases of undulant fever which have occurred in England in persons who have never left the country or have not, at any rate, been abroad for some years previous to the onset of their illness.

D. Harvey.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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1930.

[No. 7.

TROPICAL DERMATOLOGY

ZIEMANN (Hans). Die ubiquitären Hauterkrankungen bei den farbigen Rassen. [**Common Skin Diseases in the Coloured Races.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 68-78 (152-162).

This article really consists only of a tabulation of such affections, which are grouped under various headings, e.g., anomalies of pigmentation, diseases of the sweat and sebaceous glands, of the hair and nails, hypertrophies, atrophies, hyperkeratoses (including lichen planus and psoriasis), neurodermatoses (including pruritus, pemphigus and urticaria), drug eruptions, dermatitis, parasitic diseases (subdivided into fungus and animal), acute infections (including impetigo, sycosis, variola, etc.), chronic infections (including tuberculosis, mycosis fungoides, etc.) and neoplasms. The classification adopted will not receive universal acceptance and there is no mention of syphilis. The whole article is only a reminder that any skin disease may make its appearance in a coloured patient.

M. Sydney Thomson.

KESTEN (Beatrice M.). **Observations on Skin Diseases in Porto Rico.**—*Porto Rico Jl. Public Health & Trop. Med.* 1929. Dec. Vol. 5. No. 2. pp. 185-187. [School of Trop. Med., Univ. of Porto Rico, San Juan.]

An analysis of 560 patients seen between May and August of last year. Fungus infections made up 40 per cent. of the total, pigmentary changes accounted for 22 per cent. and staphylococcal infections amounted to 15 per cent. There were only three cases of acquired syphilis and only one case of true chronic eczema. The common affections of the skin accounted for the remainder of the cases in about equal numbers.

M. S. T.

FOX (Howard). **Dermatology in Brazil.**—*Arch. Dermat. & Syph.* 1929. Nov. Vol. 20. No. 5. pp. 621-628. With 1 text fig.

The author gives a brief review of his experiences in Brazil and succeeds in impressing the reader with the size and importance of that

country and its work. For example, the University of Rio de Janeiro has about 2,500 medical students. Instruction in dermatology is given to sixth-year students for six hours a week during the whole college year of eight months. The new clinic there will contain 150 beds and elaborate laboratories, etc. In Rio, cases of *coccidioides* infection (blastomycosis), granulomatosis inguinalis, xeroderma pigmentosum, ainhum, etc., were seen. At São Paulo a similar large school is under construction, and here about 70 per cent. of the patients suffer from cutaneous leishmaniasis, many having gross involvement of the naso-pharynx. Mycetoma, "mossy foot," coccidioidal granuloma, pemphigus vegetans and pemphigus foliaceus were also seen. It is estimated that 14 per cent. of the population is infected with syphilis and during the last year in Rio there were 1,500,000 visits paid to the various venereal dispensaries. There is a new hospital with 350 beds and complete research laboratories, built for the treatment of syphilis alone. The prevalence of leprosy in Brazil is shown by the census of last year, with 14,322 cases in the republic. Large hospitals, colonies and asylums for children born of leprous parents are maintained. At the Institute of Hygiene in Rio satisfactory results are being obtained with the complement fixation test for leprosy, using Deycke's antigen (defatted *Streptothrix leprae*).

M. S. T.

PHOTINOS (Panagiotis). Quelques formes rares de maladies cutanées exotiques. [**Rare Varieties of Tropical Skin Diseases.**]*—Ann. Dermat. et Syph.* 1929. Nov. 6th Ser. Vol. 10. No. 11. pp. 1231-1255. With 29 figs.

An article based on the study of 29 wax models recently presented to the Saint-Louis Hospital by SABOURAUD. Many of them should be classified as "rare" rather than as "tropical" diseases, e.g., those representing xeroderma pigmentosum, mycosis fungoides, porokeratosis, etc. Nine of the specimens portray rare forms of cutaneous leishmaniasis, some closely resembling primary chancres and gummata, one case which can be described as erysipeloid and one patient in whom the nodules were not infiltrated but soft. The remaining six models demonstrate uncommon varieties of leprosy.

M. S. T.

CATANEI (A.). Observations statistiques et parasitologiques sur les teignes chez des indigènes du Sud Constantinois (Algérie). [**Ring-worm among the Natives of S. Constantine (Algeria).**]*—Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 299-302. [1 ref.]

This work was carried out along the same lines as were adopted by the author in S. Oran and Algiers; similar results have been obtained. Of 719 patients examined, 140 (19.4 per cent.) were infected, 56 with *Trichophyta*, 83 with *Favus* and 1 with both. On culture, *T. glabrum*, *T. violaceum* and *A. schoenleinii* only were found. *Favus* is much the most common in El Kantara. The majority of cases were between 5 and 10 years of age.

M. S. T.

SILVA (Flaviano). *Tinea nigra* (cladosporose epidermica). [*Tinea nigra* (Dermal Cladosporosis).]—*Brasil-Medico*. 1929. Aug. 10. Vol. 43. No. 32. pp. 924-926. With 1 text fig. [20 refs.]

This condition, first described by MANSON in 1872 in South China, was studied by CASTELLANI in Ceylon in 1905 and the parasitic fungus was named *Cladosporium mansonii*.

The first case recorded in Brazil was in Rio de Janeiro in 1921, but the fungus isolated differed somewhat on culture and was denominated *Cladosporium werneckii*. Cure is readily secured by local application of 1 per cent. iodine followed by an ointment of salicyclic acid and yellow oxide of mercury.

H. Harold Scott.

DA VEIGA (Americo). Algumas especies novas de cogumelos causadores de tinhas. [*New Species of Trichophyton*.]—*Brasil-Medico*. 1929. July 20. Vol. 43. No. 29. pp. 830-838. With 4 text figs.

The author describes four species of *Trichophyton* and compares them in detail with others already known and concludes that they do not conform to any of the latter. He has named them *Trichophyton bicolor* (because of a reddish-yellow and a green colour on growth), *T. flavivirens* (also with a green growth), *T. cineraceum*, and *T. acutulum*. The first was very contagious, the patient infecting three others in the family, and the cultures retained vitality for at least two years, giving exuberant growth on sub-culture.

H. Harold Scott.

HOOLBOOM (L. E.). *Dhobie-Itch and other Epidermophytoses. (A Contribution to the Study of the Epidermophytoses.)*—*Acta Leidensia (Scholae Med. Tropicae)*. 1928. Vol. 3. pp. 263-293. With 10 plates. [41 refs.]

This article contains very full descriptions of the ordinary cultural forms and of the microcultural ("hanging drop") appearances of the following epidermophytoses: *E. inguinale*; *E. cruris*; *E. clypeiforme*; *E. interdigitale*; *E. rubrum*; *E. plurizoniforme*; *E. lanoroseum*; *E. niveum*. The illustrations are exceptionally good.

M. S. T.

MCGUIRE (C.). *Colour Variations in the Fungus of Dhobie's Itch (Epidermophyton cruris)*.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927*. Vol. 2. pp. 438-441. [School of Trop. Med. & Hyg., Calcutta.]

Nine strains of *Epidermophyton* were cultivated and showed variations in colour, presence or absence of downiness, number of concentric rings, and the character of the radial furrows. Morphological study indicated that the nine strains were all varieties of the one species, *Epidermophyton cruris*.

P. Tate.

MAXWELL (T. A.). *Treatment of Epidermophytosis (Dhobie Itch) with Castellani's Fuchsin Paint*.—*Jl. Trop. Med. & Hyg.* 1929. June 1. Vol. 32. No. 11. p. 148. [1 ref.] [Dermat. Dept., Tulane Univ., New Orleans.]

The author places on record the marked success which has attended the treatment of chronic and resistant cases by this method.

M. S. T.

CARRIÓN (A. L.). **Preliminary Report on the Fungus causing Epidermophytosis of the General Surface of the Skin in Porto Rico.**—*Porto Rico Jl. of Pub. Health & Trop. Med.* 1929. Sept. Vol. 5. No. 1. pp. 40-44. With 2 plates. [3 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

General epidermophytosis is found in over 6 per cent. of skin patients in Porto Rico. The disease is very contagious, has a marked tendency to generalize, may affect all parts of the skin, including the scalp, and often injures or destroys the nails. The causal fungus resembles *Epidermophyton rubrum*, Castellani, 1910.

P. Tate.

PANJA (Ganapati). **The Malassezia of the Skin, their Cultivation, Morphology and Species.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 442-456. With 7 text figs. & 3 plates (1 coloured).

After many unsuccessful attempts with many different media, the author cultivated the three organisms, *Pityrosporon ovalis*, Sab., 1895, from cases of dandruff, seborrhoea, etc.; *Malassezia (Microsporon) furfur* (Charles Robin, 1853), from cases of pityriasis versicolor; and *Malassezia tropica*, Cast., 1905, from cases of tinea flava.

For primary cultures the best medium is modified Petroff's—meat infusion in 15 per cent. glycerinated water, and the whole contents of an egg, equal parts, with the addition of 0.004 per cent. gentian violet. Growth occurs most readily at the junction of the dry and moist areas of the medium and may be either chalky or pinkish. Sub-cultures grow on all laboratory media, but best on glucose or glycerin agar. Growth is best at 37° C., but takes place at room temperature, and occurs from pH 5 to pH 9, the optimum reaction being pH 5-7.5. The fungi are aerobic and do not ferment any sugars. They resist formalin vapour for two hours, but are killed by sulphur dioxide in half a minute or less.

From its cultural aspect, the author considers that *Pityrosporon ovalis* should be included in the genus *Malassezia*.

P. Tate.

DE RAYMOND. **Traitement du Tokelau par la pommade salicylique.** [**The Treatment of Tokelau Ringworm by Salicylic Acid Ointment.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1929. Apr. Vol. 7. No. 4. pp. 225-226.

A typical and generalized case of Tokelau ringworm was given injections of lugol and iodine as well as local applications of iodine, benzoic acid, chrysophanic acid, sulphur, etc. These only succeeded in increasing irritation. Then an ointment containing 5 per cent. of salicylic acid was rubbed in vigorously each day. In fifteen days the skin was clear and no relapse was observed during the next four months.

M. S. T.

CATANEI (A.). **Etude expérimentale de souches algériennes de *Trichophyton violaceum*.** [**Experimental Study of *T. violaceum* found in "Stumps" from Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 446-452. With 4 figs. on 2 plates. [1 ref.] [Pasteur Inst. of Algeria, Algiers.]

Both infected hairs and cultures of the fungus were inoculated into the scalps and other areas of various animals. The disease was

successfully transmitted to dogs, cats and monkeys. Rabbits, mice, pigeons and most guineapigs failed to contract the infection. The fungus always maintained its "endothrix" character and caused lesions in the dog and monkey which very closely resembled those seen in the human scalp. In the cats and a few guineapigs, however, the lesions were small, discrete and soon disappeared spontaneously.

M. S. T.

CATANEI (A.). Sur le pouvoir pathogène des *Trichophyton violaceum* et *glabrum* pour les animaux. [Pathogenicity of *Trichophyton violaceum* and *T. glabrum* for Animals.]—*C.R. Soc. Biol.* 1929. Apr. 26. Vol. 100. No. 13. pp. 1108-1110. [4 refs.] [Pasteur Inst., Algiers.]

The author has experimentally infected the monkey, dog and cat with cultures of an Algerian strain of *Trichophyton violaceum*, and also succeeded in infecting one out of 15 inoculated guineapigs. In these animals it behaves as an "endothrix," but the proportion of hairs found in the stage of invasion is larger than in man, and this fact led BILRIST to consider it to be an "endoectothrix." The experiments with *T. glabrum* were carried out with guineapigs, two of which were inoculated with parasitized hairs, and six with cultures on glucose agar aged 18, 34, and 14 days. After 11 days one of the two guineapigs inoculated with the 14 days old culture was found to be infected. The other was re-inoculated with a culture 25 days old and developed a ringworm patch after 10 days. The experimental lesions lasted about 3 weeks and were finely scaly, with dry white scales, and a certain number of fallen hairs, but the patches were not bare. In the hairs *T. glabrum* behaved as an endothrix and resembled *T. violaceum*.

P. Tate.

TATE (P.). On the Enzymes of Certain Dermatophytes, or Ringworm Fungi.—*Parasitology*. 1929. May. Vol. 21. Nos. 1 & 2. pp. 31-54. [28 refs.] [Molteno Inst., Univ., Cambridge.]

A very complete account of the experiments and their results which should certainly be read in full by those interested in this particular aspect of the physiology of fungi. The enzymic activity was studied in the following species: *Sabouraudites radiolatus*; *S. lanosus*; *S. audouini*; *Trichophyton tonsurans*; *Grubyella schoenleinii*. From the clinical point of view it is interesting to note that the presence of keratinase could never be demonstrated, and that all contain a proteolytic enzyme which is really active only in an alkaline medium.

M. S. T.

LANGERON (Maurice). Le *Trichosporium pedrosoi* (Brumpt, 1921), agent de la dermatite verruqueuse brésilienne. [*Trichosporium pedrosoi*, the Cause of Brazilian Dermatitis Verrucosa.]—*Ann. Parasit. Humaine et Comparée*. 1929. Mar. 1. Vol. 7. No. 2. pp. 145-150. With 2 text figs. [7 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The parasite of Brazilian dermatitis verrucosa (chromoblastomycosis) has been isolated and placed in different genera by various authors at different times. Langeron now considers that it is really a *Trichosporium* and gives its synonymy as follows:—*Trichosporium pedrosoi* (Brumpt 1921). Synonyms:—*Hormodendron pedrosoi* (Brumpt 1921); *Acrotheca pedrosoi* (Brumpt 1921), Terra, Torres, da Fonseca et Leao; *Trichosporium pedrosianum* (Ota 1928).

P. Tate.

HORTA (P. de F. Parreiras). L'achromie parasitaire au Brésil (note préliminaire). [**Parasitic Achromia in Brasil.**]—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1930. Feb. Vol. 1. No. 2. pp. 152-154. With 1 text fig.

Certain cases have recently been seen by the author which would seem to be similar to those described in Madagascar by FONTOYNOT. The dark skin of the native shows white or yellowish scaly discs and microscopy demonstrates abundant mycelial elements. Cultures differ from those obtained in Madagascar. A brief preliminary account which is to be amplified later.

M. S. T.

DE MELLO (Froilano) & RODRIGUES (A.). Sur un cas de blastomycose à placards multiples végétants verruqueux ou pustulo-ulcérés. [**A Case of Blastomycosis.**]—*Bull. Soc. Path. Exot.* 1929. Mar. 13. Vol. 22. No. 3. pp. 142-147. With 2 text figs. [School of Med., Nova Goa, Portuguese India.]

— & —. Preliminary Note on a Case of Dermatomycoosis with Multiple Verrucose or Ulcerated Patches.—*Antiseptic.* 1929. Apr. pp. 427-432. With 8 figs. on 2 plates.

This case, the first of its kind to be recognized in Portuguese India, occurred in a youth of 18 years and gave a continuous history over the previous 8 years. A full clinical description is amplified by illustrations, which are, however, poor. The histology of the lesions and of the parasitic elements are detailed, as are experimental inoculations of rabbits and white mice. The organism is in this case a *Monilia*. No form of treatment has so far had any influence on the progress of the disease.

M. S. T.

PEÑA CHAVARRIA (A.) & SHIPLEY (Paul G.). Contribución al estudio de los carates de América tropical. [**Contribution to the Study of Pinta in Tropical America.**]—Reprinted from *Rev. Méd. Latino-Americana*. 1925. Mar. Vol. 10. No. 114. 76 pp. With 3 maps, 4 diagrams & 18 figs. on 20 plates. [38 refs.]

This is more than a contribution to the study of the various forms of carate; it is a survey in some detail of the whole subject. Sections of the essay deal with the history of the disease, which is traced from doubtful references in the early sixteenth century to the present day, the geographical distribution illustrated by maps showing that it exists in Mexico, Central and South America, the islands of the Caribbean, the Guianas and Venezuela. In greater detail the prevalence is given in various districts of Colombia. Next follows a general clinical description, with fuller accounts of the individual varieties—white, black, violet, blue and red—and a discussion of the diagnosis from leprosy, morphea, pellagra, chloasma and other pigmentary skin disorders. Its aetiology is dealt with under the headings of race, sex, age and occupation. A description of the associated fungus, an *Aspergillus*, follows, with photographs of cultures on Sabouraud's medium, and microphotographs of sections of the skin showing the growth in, and involvement of the sebaceous glands and deeper layers of the cutis. Two possible insect vectors are mentioned, *Simulium haemotopotum* and *S. ochraceum*, and, finally, treatment is considered.

This consists in the local application of iodine, or, better, an ointment containing calomel 1 gm., salicylic acid 0.05 gm., lanoline 50 gm., and the use of arsenic internally. The whole constitutes a good and full account of this interesting and too little studied condition.

H. Harold Scott.

CIFERRI (R.). Sur un *Acrothecium* isolé du "mal de pinto" mexicain, *Acrothecium nigrum* n. sp. [*Acrothecium nigrum* n. sp. isolated from Mexican Pinto.]—*Ann. Parasit. Humaine et Comparée*. 1929. Nov. 1. Vol. 7. No. 6. pp. 524-535. With 3 text figs. [8 refs.] [National Agronomic Station & Agric. College, Moca, Dominican Republic, Haiti.]

A fungus isolated from a case of "black pinta" in Mexico is considered to be a new species of the genus *Acrothecium* Preuss emend. Sacc. nec Corda, and is named *Acrothecium nigrum*. The validity and synonymy of the genus *Acrothecium* is discussed and the author thinks the new species may prove to be near *Montoyella nigra* Castellani, which is also found causing "black pinta."

P. Tate.

DA FONSECA (O.) & LEÃO (A. E. de Arêa). [In Portuguese & English.] Sobre os cogumelos da pedra brasileira. **On the Fungus of Brazilian Piedra.**—*Inst. Oswaldo Cruz. Suplemento das Memórias*. 1928. Dec. No. 4. In Portuguese pp. 124-125. With 4 figs. on 2 plates. In English pp. 126-127. [Oswaldo Cruz Inst. & Med. School, Rio de Janeiro.]

— & —. Sur les champignons de la piedra brésilienne. [**The Fungi of Brazilian Piedra.**]—*C.R. Soc. Biol.* 1929. Apr. 8. Vol. 100. No. 11. pp. 935-936. [Oswaldo Cruz Inst., & Dermat. Clinic, Faculty of Med., Rio de Janeiro.]

In 1911 HORTA described in the nodules of Brazilian "piedra" spherical cysts each of which contained a number of fusiform ciliated bodies. The presence of these cysts led BRUMPT to separate the parasite of Brazilian "piedra" under the name *Trichosporum hortai* from the Colombian form known as *Trichosporum giganteum*. The present authors suggest that the Colombian cases have not been sufficiently studied to make sure whether or not the cysts of Horta are present; and further suggest that these cysts are really asci with fusiform ascospores. They have obtained two types of cultures from "piedra," both of which may be isolated from the same case. The first type has black, dry colonies covered with aerial hyphae, and corresponds to the species *T. hortai* of BRUMPT; and the second has white or yellowish, smooth, dry or moist, rough or cerebriform colonies, and resembles cultures of European and Asiatic species of *Trichosporum*. Recently, on aged cultures of the *T. hortai* type on carrot, fusiform, elongated spores were found which are similar to those present in the nodules of Brazilian "piedra." These spores are characteristic of the new genus *Piedraia* which the authors have formed for the parasite of Brazilian "piedra," the type species being *Piedraia hortai* (Brumpt, 1913).

P. Tate.

LANGERON (Maurice). Les asterinées parasites de l'homme. La piedra. [*Asterineae parasitizing Man. Piedra.*—*Ann. Parasit. Humaine et Comparée*. 1929. July 1. Vol. 7. No. 4. pp. 309-324. With 18 text figs. [16 refs.]

The Asterineae are a group of pyrenomycetous fungi parasitic on the surfaces of leaves in very moist climates, especially in the intertropical zones. They form dark-coloured patches on the leaves constituted of a coriaceous stroma in which are developed more or less differentiated perithecia. South American piedra has a distribution parallel to that of the Asterineae, and since the nodules on the hairs in cases of piedra resemble the stromata of the Asterineae in structure, and the "cysts of Horta" are, in the author's opinion, asci containing vermiform ascospores, he concludes that Brazilian and Paraguayan piedra are due to a primitive type of pyrenomycetous fungus near the *Protothyriaceae*. The fungi of S. American piedra are very different from those causing European and Asiatic piedra, which have not the characters of Asterineae and should remain in the genus *Trichosporum* (Behrend, 1890), Vuillemin, 1902; while the S. American forms should be placed in the new genus *Piedraia* proposed by da Fonseca and Leão, 1928. Not sufficient is known about Colombian piedra to allow it to be placed in either group at present.

P. Tate.

DELAMARE (G.) & GATTI (C.). Culture de la "piédra" paraguayenne. [*Culture of Paraguayan "Piedra."*—*C.R. Soc. Biol.* 1928. Nov. 9. Vol. 99. No. 31. pp. 1425-1427.

Cultures of the Paraguayan variety of *Trichosporum hortai* were obtained from infected hairs which had been kept dry for several weeks. Cultures were obtained on Sabouraud's glucose agar with litmus; and the fungus also grew on maltose, lactose, laevulose, and glycerin agar, and on carrot and potato. Growth was very slow at room temperature and practically nil at 37° C. Cultures are black, shading to grey at the periphery, and the mycelium is formed of hyphae of rectangular cells which measure 6 by 4.5 microns to 9 by 3 microns.

P. Tate.

AARS (Ch. G.). Over het voorkomen van piedra in Suriname. [*On the Occurrence of Piedra in Surinam.*—*Nederl. Tijdschr. v. Geneesk.* 1929. Aug. 24. 73rd Year. 2nd Half. No. 34. pp. 3903-3910. With 3 text figs. [9 refs.] [Military Hosp., Paramaribo.]

The author's conclusions from his observations are the following:

1. In Surinam a type of piedra occurs, probably identical with piedra Brasiliana.
2. Of 30 samples examined, 26 originated from Creoles (among them 3 women), 3 from Europeans and 1 from a Javanese.
3. The Surinam piedra is not a purely epiphytic affection.
4. Cultures, if taking at all, develop very slowly.
5. The causative agent is most probably an ascomycete, presumably belonging to the genus *Penicillium*.

6. The contagiousity of the piedra fungus is low and the way of transmission is so far unknown. An experimental infection did not succeed.

The author deals with the differential diagnosis from other Trichosporum infections, Trichomycosis nodularis, Pediculosis capitis, Trichorrhexis nodosa and Aplasia moniliformis pilorum. Treatment with spirituous disinfectants (if necessary after cutting the hair) usually leads to a rapid cure.

W. J. Bais.

MONTPELLIER (Jean). Les mycétomes algériens. [**Mycetoma in Algeria.**—*Rev. Prat. Malad. des Pays Chauds.* 1928. Dec. Year 7. Vol. 8. No. 12. pp. 595-596; 599-602; 605-607. [4 refs.]

The author includes under this heading all fungus infections except ringworm. A review of the literature reveals only 31 cases, including sporotrichosis, blastomycosis, actinomycosis, etc. To this number he adds eight cases of his own and states that any of these infections may belong to one of three clinical types. In the first group are the very early infections which are seen as small, hard nodules in the skin or subcutaneous tissues. The second group contains older lesions which have attained the size of a nut. Finally, there are the long-standing cases in which the infection has spread to involve all the adjacent structures, e.g., Madura foot. Detailed descriptions are given of the histological appearances at each of these stages.

M. S. T.

SILVA (Flaviano). Contribuição para o estudo do mycetoma podal na Bahia. [**Madura Foot in Bahia.**—*Sciencia Med.* 1929. Apr. Vol. 7. No. 4. pp. 153-162. With 6 figs. on 2 plates. [23 refs.]

The author has collected ten cases of mycetoma of the foot in Bahia; he narrates in detail two of his own cases. The first was very extensive, the thigh and the groin glands being affected; the disease having existed for 14 years, amputation was decided upon; the granules were yellowish-white. The second involved the foot only, the granules were black, and treatment by curetting sufficed to cure. Cultivation proved the organism to belong to the *Madurella*, but is believed to be a new species. Inoculation into two guineapigs has not succeeded.

H. Harold Scott.

DELANOË (P.). Mycétome de la cuisse observé chez un marocain adulte, du à une microsiphonée, *Nocardia nicolleti*, n. sp. [**Mycetoma of the Thigh due to *Nocardia nicolleti* n. sp.**—*Arch. Inst. Pasteur de Tunis.* 1928. Sept. Vol. 17. No. 3. pp. 257-274. With 3 figs. [2 refs.] [Mazagan Hosp., Morocco.]

— Au sujet de l'histoire de l'étude des mycétomes observés au Maroc. —*Ibid.* 1929. Mar. Vol. 18. No. 1. pp. 71-72. [6 refs.]

The patient, an adult Arab aged 50, had a mycetoma of 11 years' duration involving the upper two-thirds of the right thigh, but not invading the abdomen. The clinical aspect was that of a typical mycetoma. The pus contained numerous yellowish grains, 0.5-1 mm. in diameter, of very soft

consistency, and formed of an enrolled cord-like mass. Cultures of an *Actinomyces* were readily obtained on all the usual media. It closely resembles *Nocardia* [*Actinomyces*] *dassonvillei*, from which it differs only in being a facultative anaerobe, and in forming a yellowish pigment on potato. It is regarded as a new species and is named *Nocardia* [*Actinomyces*] *nicollei*. Cultures were not pathogenic for pigeons, rabbits or guineapigs. Intensive treatment with potassium iodide led to improvement, but the patient left hospital and died about six months later.

The second paper corrects some historical statements made in the first.

P. Tate.

PUESTOW (K.L.). **Maduromycosis. A Contribution to the Study of Maduromycosis, with Report of a Case of Infection with *Aspergillus nidulans*.**—*Arch. Dermat. & Syph.* 1929. Nov. Vol. 20. No. 5. pp. 642-664. With 14 text figs. [19 refs.] [State of Wisconsin General Hosp., Madison.]

A long and detailed account is given of the history, etc. of this affection. There is then described a case occurring in a white girl aged 19, who had never been south of New York until after the onset of the disease. Nose, cheeks, the extensor surface of the right forearm and the skin behind the right ear were affected. After repeated failures to eliminate the disease over a period of six years, cure was ultimately attained by wide excision, including a liberal margin of apparently healthy tissue. The organism was proved to be *Aspergillus nidulans*.

M. S. T.

VASUDEVAN (A.) & SESHADRINATHAN (N.). **A Few Observations on Mycetoma : a Preliminary Communication.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 170-173.

Fungi [the names of which are not given] from cases of red, black and white mycetoma were cultivated on bamboo-twigs, stems of prickly pear and on soil medium. The authors consider that observation of the mode of growth of fungi from mycetomas on such substances may aid in identifying them if they are met with growing saprophytically in nature.

P. Tate.

DELAMARE (G.) & GATTI (C.). Hyphomycète cultivable à grains blancs réniformes et durs (*Indiella americana*). [**Cultivable Hyphomycete with White, Reniform, Hard Grains.**]—*C.R. Acad. Sci.* 1929. May 6. Vol. 188. No. 19. pp. 1264-1266. With 3 text figs.

Grains from a case of mycetoma of the foot were formed of a sterile hyphomycete which is near *Indiella mansonii*, but is described as a new species and is named *Indiella americana*. The grains measure 0.25 mm. to 0.5 mm., or exceptionally 1 mm., in diameter, and are opaque, milky white, hard and fragile. They are generally reniform, but are sometimes ovoid and rarely multilocular. They are composed of branched, septate mycelium, the segments of which measure 6 to 23 by 0.5 to 4 microns; ovoid or piri-form cells 3 to 8 by 7 to 11 microns; and a colourless interstitial substance. The growth on various media is described. Inoculation of the foot of a pigeon, according to Pinoy's technique, was negative. Intradermal injection of 3 drops of an antigen, formed of a month-old culture on broth heated to 120°, caused a marked cuti-reaction in the patient; while similar injection of 8 controls, one of whom had a different type of mycetoma, was negative.

P. Tate.

- LANGERON (Maurice). Mycétome a *Torula jeanselmei* Langeron, 1928. Nouveau type de mycétome à grains noirs. [**Mycetoma with Black Grains due to *Torula jeanselmei*.**]—*Ann. Parasit. Humaine et Comparée*. 1928. Oct. 1. Vol. 6. No. 4. pp. 385–403. With 12 figs. [9 refs.] [Parasit. Lab., Faculty of Med., Paris.]

This paper gives a detailed account of the fungus, *Torula jeanselmei*, isolated from a case of black-grained mycetoma [see this *Bulletin*, Vol. 26, p. 106]. The synonymy of the genus *Torula* is discussed in detail, and the priority of *Torula* Persoon, 1796, emend. Saccardo, 1880, over *Torula* Turpin, 1838 sensu Pasteur-Hansen, emend. Will, 1917, is established. The morphology of *Torula jeanselmei* enables the diagnosis of the genus to be made more precise.

P. Tate.

- GASTAMINZA (Ubaldo). Un caso de maduromicosis en el Rif. [**A Case of Maduromycosis in the Rif.**]—*Medicina Paises Cálidos*. Madrid. 1929. Sept. Vol. 2. No. 5. pp. 445–449. With 2 text figs.

A typical case of Madura foot, due to a *Madurella* type with black spores.

H. Harold Scott.

- ACTON (Hugh W.) & MCGUIRE (C.). **Keratolysis Plantare Sulcatum, a Lesion due to an Actinomycotic Fungus.**—*Indian Med. Gaz.* 1930. Feb. Vol. 65. No. 2. pp. 61–65. With 3 plates (1 coloured). [8 refs.]

The authors believe this condition to be identical with that described by CASTELLANI as keratoma plantare sulcatum, and its differential diagnosis from tylosis, occupational keratoderma, fungal and eczematous keratodermias and keratoderma cribrata (or punctata) is fully discussed. In Bengal the lesions occur on the soles of those who walk barefooted on damp earth during the monsoon months. The lesions start as small pits in the thickened epidermis of the heel and tread of the foot. These gradually deepen, the edges being irregular and dark. Coalescence and furrowing then give rise "to an appearance like the surface of a moderately coarse sponge." In fact, there is no hyperkeratosis or plugging, but a definite lysis of the horny layer. Lesions on the hands are very rare. The fungus, which has been found in each of eight cases, resembles the *Actinomyces bovis* of the American Type Culture Collection. Full cultural details are given and there is described a modification of Ponders' stain whereby fungus can be easily detected even in thick pieces of epidermis. This consists of 1 per cent. of toluidin dissolved in 2 per cent. of glacial acetic acid, 4 cc. of absolute alcohol and 93 cc. of water. The material is then cleared in glycerine and can be examined whilst wet. In hospital cure is easily obtained by painting with 5 per cent. formalin, *i.e.*, whilst the patient's feet can be kept dry. Prevention can be attained by using the same solution once a week during the monsoon months.

M. S. T.

- JIMENEZ (Carlos Manuel). **Tropical or Phagedenic Ulcer.**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 180–183. [United Fruit Co. Hosp., Port Limon, Costa Rica.]

Stress is laid on the presence of fusiform bacilli and spirochaetes. These the author regards as pathogenic, as he refers to

secondary infections with other organisms. In discussing the differential diagnosis he emphasizes the fact that the sites of election are the lower third of the leg and the dorsa of the feet. "It is exceptional to find the true tropical ulcer on other parts of the body," this being due to the fact that the lesions are caused by exposure of a superficial wound to infected damp floors or mud. "The ulcers appear to exist in two types, one of slow evolution (atonic forms) and the other of a malignant type, phagedenic and gangrenous." Treatment consists of a preliminary bath in Dakin's solution, this being followed by local applications of gauze saturated in 4 per cent. neoarsphenamine in glycerine. This is supplemented by injections of the same drug and a general course of tonics.

M. S. T.

BRANCKAERT (J.). L'ulcère phagédénique ou tropical et son traitement. [**Phagedaenic or Tropical Ulcer and its Treatment.**]—*Bruxelles-Méd.* 1929. Aug. 25. Vol 9. No. 43. pp. 1205-1207.

A general account of the condition and its treatment. Whilst recommending neosalvarsan in glycerine as a local application, the author believes that injection of that drug is useless. Heliotherapy and dressings with calcium hypochlorite are recommended. If much mucoid exudate is present 50 per cent. ac. carbolic in glycerine produces good results. Stress is also laid on the importance of dealing with any other affections from which the patient may be suffering, on the necessity of prolonged treatment and on the necessity of observation over a long period after apparent cure.

M. S. T.

PINTO (Genserico de Souza). Considerações acerca da ulcera phagedenica tropical. [**Phagedaenic Tropical Ulcer.**]—*Folha Med.* 1929. Oct. 5. Vol. 10. No. 28. pp. 343-345. With 4 text figs. [5 refs.]

In Bocayuva, State of Minas Geraes, tropical ulcer is very common and causes much incapacity among agricultural labourers. In the early stages the author found a Gram-positive diplococcus so frequently that he believes it to be of aetiological significance, as well as Vincent's treponema and *B. fusiformis*. He finds the best treatment is the local application of powdered neosalvarsan.

H. Harold Scott.

MAASS (Edgar). Zur Behandlung hartnäckiger Ulcera der Zehen. [**Treatment of Resistant Ulcers of the Toes.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. May. Vol. 33. No. 5. p. 303.

A brief note in which it is stated that these lesions are regarded as varieties of *ulcus molle tropicum*. The author removes the nail under local anaesthesia. Healing is then usually rapid and uncomplicated under constant dressings with 0.2 per cent. lotions of tryptoflavine or argoflavine.

M. S. T.

MACIEL (Heraldo). Sobre o tratamento da ulcera phagedenica tropical. [**The Treatment of Phagedaenic Tropical Ulcer.**—*Sciencia Med.* 1929. Sept. Vol. 7. No. 9. pp. 471-474.]

Two cases are recorded in which success followed the use of neosalvarsan injections and the local application of 0.09 per cent. "914." In the second patient, a child of 11 years, a second course of injections was needed, and the local use was stopped as the injections alone appeared to give better results.

H. Harold Scott.

BISWAS (Satya Kinkar). **A Simple Treatment for Naga Sores.**—*Indian Med. Gaz.* 1930. Feb. Vol. 65. No. 2. pp. 88-89. With 1 text fig.

After thorough cleansing of the leg with soap and water, the ulcer is painted with pure carbolic acid. The surrounding areas are protected with vaseline and any excess of acid is removed with cotton-wool. Thereafter the ulcer is dressed daily with sterile vaseline. "In almost all cases the cure is effected in a week or so, but, should the slough re-appear, a second application by the same procedure is sure to bring about a cure."

M. S. T.

WEST (C. O.) & CURTH (W.). Die amerikanische Form der Creeping-Disease. [**The American Form of Creeping Disease.**—*Dermat. Woch.* 1929. Feb. 16. Vol. 88. No. 7. pp. 229-232. With 4 text figs. [8 refs.] [Rudolf Virchow Hosp., Berlin.]

The form of creeping disease described as American appears to be of frequent occurrence in some of the southern States of the U.S.A., and is here defined (with illustrative figures) as an extensive network of sinuous linear skin-eruptions due to the meanderings of larvae of *Ancylostoma brasiliense* (= *caninum*) between the corium and the stratum granulosum. The movements of the larvae cause intolerable itching and are said to murder sleep at night. Many hundreds of these creeping lines have been observed in one patient. They progress at the rate of about 1 cm. in 24 hours, but may go twice as fast. The tracks frequently become bloody, or vesiculous and pustulous. The wanderings of the larvae may cease in 2 or 3 weeks, or may continue for 3 months; and finally their tracks heal spontaneously, with encapsulation of the individual larvae. 50 per cent. of the cases of this form of creeping disease become infested on the seashore when bathing in places polluted with the faeces of dogs and cats. The lines of treatment mentioned are freezing the infested skin with carbonic acid snow or with ether spray; painting it with collodion, or with tincture of iodine—alternately with use of mercurial ointment or ultra-violet rays; compresses of 1 per cent. solution of picric acid.

A. Alcock.

GIGLIOLI (George). **Creeping Eruption : Case Report from British Guiana.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Mar. 9. Vol. 22. No. 5. pp. 443-445. With 1 plate. [5 refs.]

The eruption in this case was on the buttock, and began with a mild papular erythema, which lasted for four days, and was followed by the formation of inflammatory nodules, and by very distressing itching

exacerbated at night—a condition that continued for seventeen days. The meandering, which was entirely cutaneous, between the corneal and Malpighian layers, then began (and is well shown in a photographic reproduction) and went on for about four weeks. Symptoms gradually subsided with the resorption of the products of eruption. The parasite seems not to have been identified, but the infection was contracted in the jungle where the patient had been sitting for some time on damp ground.

A. Alcock.

GRUND (Jacob L.). **Creeping Eruption (Larva migrans). Report of Case.**—*New England Jl. of Med.* formerly *Boston Med. & Surg. Jl.* 1929. Sept. 19. Vol. 201. No. 12. pp. 579–582. With 5 text figs. [23 refs.]

Report of a case of creeping eruption, thought to have originated on a Florida beach and to be due to a nematode worm, cured by two applications of carbon dioxide snow. The history of the subject is reviewed and a bibliography is added; but these things have lately been noticed in this *Bulletin* (Vol. 23, p. 407, and Vol. 24, p. 449).

A. Alcock.

BACKHOUSE (T. C.). **Sarcoptic Skin Disease in Natives of the Territory of New Guinea.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 173–178. With 9 figs. on 2 plates. [8 refs.]

A full clinical and histological description of the disease known locally as “kas-kas.” The author has succeeded in demonstrating the presence of a parasite in 149 out of 424 cases and this in circumstances which permitted but a brief examination of each patient. This parasite seems to be identical with *Sarcoptes scabiei*. It burrows in the horny layer and gives rise to “runs,” which are difficult to see in a black skin, but which are most easily detected on the fine skin of the penis. The distribution of the eruption is that usual to scabies, but some cases show such marked crusting and scaling as to suggest “Norwegian scabies.” This change commonly occurs in emaciated patients suffering from chronic dysentery, etc. The author succeeded in transferring the disease experimentally to himself. Attention is drawn to the similarity between this affection and the “craw-craw” of Sierra Leone.

M. S. T.

PAMPANA (Emilio J.). Sul “Mossy Foot.” Descrizione dei primi casi Colombiani. [**The First Cases of Mossy Foot described in Colombia.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Oct. 1. Vol. 10. No. 10. pp. 465–478. With 3 text figs. English summary p. 479.

The author gives an account of two cases, with photographs, showing the condition of mossy foot. He treated the first with neosalvarsan, alternately with bismuth (Muthanol), and later with potassium iodide. Locally he applied acroflavine, 0.1 per cent., alternately with 0.2 per cent. potassium permanganate. A second photograph showing the condition after three months demonstrates well the improvement. He discusses the diagnosis, dividing cases into two main types: one with confluent papillomatous masses, cauliflower-like, ulcerating early, and producing a discharge and thick crust like a large yaws nodule, the other verrucose, but not confluent, not readily ulcerating, but

resembling elephantiasis. He then considers the distinctive points of blastomycosis, cutaneous leishmaniasis, syphilis, tuberculoma, etc., and maintains that "mossy foot" should not be regarded as a specific entity without further investigation, the name being restricted at present to cases of undetermined aetiology.

H. Harold Scott.

SALISBURY (E. I.). Mossy Foot—a Case Report.—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. p. 185–190. With 7 figs. [1 ref.] [United Fruit Co. Hosp., Limon, Costa Rica.]

A Jamaican aged 68 presented a "horny-like spur" just above the heel of the right foot which had been present for six years. The mass had a diameter of 2.5 cm. and a height of 2 cm. It was composed of a friable keratoid material and had a moist ulcerating crater. This was excised under local anaesthesia. The accompanying microphotographs are excellent. The presence of *Phialophora verrucosa* was determined by the microscope only. It was not cultivated.

M. S. T.

MACARTHUR (W. P.). A Case of Epidermolysis Bullosa complicating Malaria.—*Jl. Roy. Army Med. Corps.* 1929. July. Vol. 53. No. 1. pp. 47–50. With 2 figs.

Typical epidermolysis bullosa in a man aged 40, which had first started three years before and had got rapidly worse with the onset of severe malaria. There was no family history other than that of a brother who developed similar trouble during severe malaria. The patient was given a well-balanced diet and Promonta. Three day courses of calcium lactate (gr. 30 *per diem*) and parathyroid (gr. $\frac{1}{4}$ *per diem*) were alternated with three days free from treatment. Massage with olive oil was carried out locally. There has apparently been complete recovery.

M. S. T.

LUJAN (M.) & NAUCK (E.). Ein Fall von Epidermolysis bullosa aus Costa Rica. [A Case of Epidermolysis Bullosa in Costa Rica.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 654–656. With 2 text figs. [2 refs.] [San Juan de Dios Hosp., San José, Costa Rica.]

The first case reported from Costa Rica. A detailed description of a typical example in a girl aged 1½ years. An elder sister was similarly affected and it is interesting that the plucking of coffee berries caused vesicles to appear on the mother's hands. It is suggested that these lesions in the mother represent a mild form of the same disease and that they were not due to any susceptibility to the beans.

M. S. T.

MICHAEL (Jeffrey C.) & SEALE (Everett R.). Dermatosi papulosa nigra.—*Arch. Dermat. & Syph.* 1929. Nov. Vol. 20. No. 5. pp. 629–639. With 6 text figs. [4 refs.]

Although the disease occurs essentially among negroes, one case has been seen in a Mexican. "The disorder may appear in childhood as early as the seventh year," but puberty sees an increase in the size and number of the lesions. The incidence of the dermatosis is between 6 and 12 per cent. There are several excellent microphotographs, the chief histological changes found being acanthosis, hyperpigmentation of the epidermis and cutis and rudimentary pilosebaceous elements. It is for these reasons that it is suggested that the condition is naevoid in origin.

M. S. T.

TEDESCHI (Carlo). Le dermatosi infantili e la dermatite estiva epidemica papulo pustulosa (Uarsc) dell' oasi di Derna. [**Infantile Dermatitis and the Epidemic Papulo-Pustular Summer Eruption (Uarsc) of the Derna Oasis.**]—*Clinica Pediatrica*. 1929. Aug. Vol. 11. No. 8. pp. 721-736. With 5 figs. [Colonial Hosp., Derna, Cyrenaica.]

Among the children in the Derna Oasis in addition to the ordinary skin diseases there are special forms of a subtropical nature including an epidemic papulo-pustular eruption called "uarsc" by the natives, which Tedeschi has not met with except in Derna. It appears, however, to be prevalent along the coast as far as Tripoli, and is probably transmitted by a tick, *Argas persicus* or *Dermanyssus gallinae*.

J. D. Rolleston.

BOURGUIGNON (G. C.). Notes sur une dermatose nodulaire polymorphe ulcéreuse de l'Ubangi (Zerekoyo, Pupurru, etc. . .). [**A Polymorphic, Nodular and Ulcerative Dermatitis in Ubangi.**]—*Bull. Méd. du Katanga*. 1929. Vol. 6. No. 1. pp. 13-23. [6 refs.]

Circumstances compelled the differential diagnosis between this affection and leprosy, syphilis and yaws, to rest on clinical methods only. The months of greatest incidence are March and April. The various native names all signify "fish," and it is believed that if an infected patient eats fish the condition rapidly becomes worse, but it is noteworthy that the natives themselves use different adjectives to describe each stage of the disease. The *first or prodromal stage* may last one year. Muscular pains and headaches are succeeded by bone pains and general lassitude. The *second stage* is ushered in by the appearance of a node over some bony prominence, e.g., clavicle or wrist. Of the size of a pigeon's egg, hard and subcutaneous, it is apparently attached to the periosteum, but is freely moveable under the skin which itself shows no changes. Palpation causes marked pain and puncture yields a "cold," white or yellowish pus. This period may last "two months or more." In the *third stage* the primary tumour breaks down to leave an ulcer with a yellow base, on which are numerous small red granulations. The edge is irregular and the slightest touch causes great pain and haemorrhage which may be copious. The adjacent skin is inflamed, with local lymphangitis and swelling of the neighbouring glands. At this stage one or more nodes appear elsewhere on the body, even at a considerable distance. Lasts some months. The *fourth stage* is a period of generalization, the hands and feet being particularly affected, for in these areas the nodules, ulcers and lymphangitis may be confluent. Spontaneous cicatrization occurs in each area, but fresh lesions are constantly appearing. Gradually cachexia of extreme degree results and death occurs from a terminal infection. Pregnancy often precipitates the appearance of this last stage. During this time too the eyes and nose may be destroyed whilst the ulceration is frequently so severe in the mouth as to lay bare the subjacent bone. The proportion of female to male cases is as two to one. 'Soamine is useful in healing the ulcers, but iodine and mercury appear to be more efficient in preventing the appearance of secondary nodules. Two cases are described in detail and the article is accompanied by a table demonstrating the differences between this affection and yaws, syphilis and leprosy.

M. S. T^c

GOECKERMAN (W. H.), OSTERBERG (A. E.) & SHEARD (C.) **Eczema Solare in a Case of Hematoporphyrinuria.**—*Arch. Dermat. & Syph.* 1929. Oct. Vol. 20. No. 4. pp. 501–505. With 1 text fig. [1 ref.] [Mayo Clinic & Mayo Foundation, Rochester, Minn.]

A case of true eczema solare is reported. The accompanying haematoporphyrinuria varied from day to day and rose considerably after exposure of the whole body to the light of a mercury-quartz lamp. Localized exposures produced no such change and it was possible, experimentally, to cause the appearance of the dermatitis on the forearms only. Even then, healthy tissue intervened between the affected areas. The authors consider this condition to represent one of the mildest types of a process which may show such severe changes as are seen in hydroa vacciniforme. In all affections in which light seems to play a part the underlying cause may not lie in the general metabolism but in the metabolism of the epithelial cells themselves, i.e., they contain a substance which absorbs actinic rays with avidity; this renders the cells photosensitive and is responsible for the increased output of haematoporphyrin.

M. S. T.

MATHIS (C.) & BAURY (A.). Pyodermite rebelle de la barbe rapidement guérie par l'antivirus de Besredka. [**A Resistant Pustular Dermatitis of the Beard cured by the Use of Besredka's Antivirus.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 731–732. [Pasteur Inst., Dakar.]

The case was one of a chronic pustular folliculitis of the beard and moustache which had resisted many local treatments. At last staphylococci from the lesions were grown in Besredka's broth. After exhaustion and filtration of the culture, the filtrate or antivirus was applied locally. Cure was complete after six such dressings (? daily).

M. S. T.

IMSCHENETZKY (A.). Laporteadermatitis. Experimentelle Untersuchungen. [**Dermatitis due to Laportea moroides.**]—*Dermat. Woch.* 1929. July 27. Vol. '89. No. 30. pp. 1087–1094. With 3 text figs. [7 refs.] [State Inst. for Med. Science, Leningrad.]

An account of the botanical structure of the plant is followed by details of the various experiments made. It is concluded that the urticarial reaction is produced only by the large "hairs" of the leaves and "then only if they are introduced into pilo-sebaceous follicles or if the surface of the skin is broken." Crystals of sodium oxalate were observed in these structures. The histological picture shows simple vaso-dilatation, oedema of the cutis or a slight round-celled, perivascular infiltration. [Laportea is an Urticaceous genus wide-spread in the tropics, with stinging hairs.]

M. S. T.

BONNE (C.) & LODDER (J.). Ueber eine eigentümliche, dem Lymphogranulom und der Mycosis fungoides verwandte Allgemeinerkrankung. [**A Peculiar Systemic Disease related to Lymphogranuloma and Mycosis fungoides.**]—Reprinted from *Beiträge z. Path. Anat. u. z. Allgemeinen Path.* 1929. Vol. 83. pp. 521–540. With 12 text figs. [23 refs.] [Med. High School, Batavia, Java.]

A very full account of the case in a male native aged 42 years. During life there was obvious only a destructive, ulcerating tumour of the nose and palate, no signs of systemic infection being detected. It was rapidly fatal,

as the patient died within five months of the onset. A post-mortem discovered lesions of a similar histological and ulcerative nature in the pleura, stomach, duodenum, intestines and adrenals. Injection of material into monkeys and guineapigs gave rise to tuberculosis, but the authors do not regard this evidence as sufficient proof of the cause. The histological pictures would suggest a primary hyperplasia of the vascular endothelium of the skin and mucous membranes with subsequent formation of sarcoma-like nodules and ulceration. The staining reactions of the various cells are compared with the corresponding features found in lymphogranuloma and mycosis fungoides, no definite conclusion being reached.

M. S. T.

- CASTELLANI (Aldo) & DUVAL (Charles W.). Dermatitis Papulosa Nigra.—*Jl. Trop. Med. & Hyg.* 1929. June 1. Vol. 32. No. 11. pp. 148-150. With 2 text figs. [2 refs.]
- CATANEI (A.). Les teignes dans le Sud oranais : considérations générales, formes cliniques et parasitologie.—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 435-445. [3 refs.] [Pasteur Inst. of Algeria, Algiers.]
- KHANDEHAR (K. G.). Naga Sores in Gwalior.—*Indian Med. Gaz.* 1929. Dec. Vol. 64. No. 12. p. 696. With 2 text figs.

TROPICAL MYCOLOGY.

TALICE (Rodolfo V.). Le concept actuel des mycoses médicales de l'appareil respiratoire. [**Myotic Infections of the Respiratory Tract.**—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1930. Feb. Vol. 1. No. 2. pp. 181–188. [13 refs.]

This paper is concerned with the pathological aspects of the subject only and does not describe cases, organisms, etc., in detail. The author concludes that the majority of fungi isolated are purely saprophytic and have obtained a footing in the mucous membranes after these have suffered lowered resistance as a result of microbic infection. Occasionally they may become definitely pathogenic, however, and when their presence is proved this point of view must always be borne in mind as well as the possibility that their presence aggravates the underlying condition.

M. Sydney Thomson.

BALOG (Paul) & GROSSI (Gino). Allergie der Haut bei Lungenmoniliasis. [**Skin Allergy in Pulmonary Moniliasis.**—*Arch. f. Dermat. u. Syph.* 1929. May 20. Vol. 157. No. 3. pp. 549–554. [27 refs.]

The allergic reactions in 18 cases of pulmonary moniliasis were investigated by scarification and intracutaneous and subcutaneous inoculation. The antigen consisted of an emulsion of pure culture of the monilia (*Monilia pinoyi*) in physiological salt solution.

At first the fungus was killed by heating to 65° for one hour, but this antigen gave rise to severe general symptoms. When emulsions of the living fungus were used no untoward symptoms supervened. Scarification gave negative results. Intracutaneous injection of 0·1 cc. of the antigen gave positive results in all cases, consisting of a specific reaction beginning after 24 hours. Controls of 18 healthy subjects and 35 cases of pulmonary tuberculosis and other diseases failed to give this late reaction to the antigen. Subcutaneous injection of 0·1 cc. of the antigen resulted in subcutaneous infiltration after 24 hours, which reached the size of a hazel nut in 2 to 3 days, and generally disappeared in from 6 to 7 days. Generalized symptoms, headache, nausea, fever and pains in the limbs, followed injection, but ceased the next day.

Repeated doses of the antigen led to decreased reaction, even when the doses were gradually increased, until ultimately there was no inflammatory reaction, or only such as might follow the injection of any non-specific substance. Parallel with the decreased local reaction, the objective symptoms slowly abated, the cough decreased and the fungus disappeared from the sputum.

In nearly all cases an increase of from 7–8 per cent. in the eosinophile count was observed; and also an increase of from 7–13 per cent. in the monocytes. The degree of these changes did not give any indication as to the severity of the disease.

P. Tate.

GROSSI (Gino) & BALOG (Paul). **Clinical and Experimental Studies on Castellani's Pulmonary Moniliasis.**—*Jl. Trop. Med. & Hyg.* 1929. Sept. 16. Vol. 32. No. 18. pp. 253-262. With 3 text figs. [48 refs.]

The experiments were carried out with *Monilia pinoyi* Cast. ; and in all cases an emulsion of one loop of pure culture in 3 cc. of physiological salt solution was used for the inoculation. White rats were inoculated, each with 0.5 cc. of the emulsion, 6 subcutaneously, 3 intraperitoneally, and 6 intrapulmonarily. Subcutaneous and intraperitoneal inoculation gave only a slight local reaction, if any ; but intrapulmonary inoculation caused death in 10-14 days. The lungs of the latter animals were the only organs affected and showed advanced hyperaemia of the arteries and contained numerous small, tuberculiform, yellowish nodules. In the nodules [the development and histology of which is described in detail] the fungus was abundant and was also present in the general tissue of the lungs.

Subcutaneous and intradermal inoculation of guineapigs resulted in only a transitory infiltration. Intracardial injection of 1 cc. of the emulsion into 4 guineapigs was fatal in 20-24 days, and blood taken aseptically from the heart after death gave cultures of the monilia. Death was due to acute septicaemia resulting in inflammatory oedema of the lungs and diffuse necrosis of the spleen, the fungus being present in both organs.

An account of the work on the allergy reactions of the monilia in man previously published by the authors [see this *Bulletin* above] follows, together with a detailed description of one case of moniliasis.

Exposure of cultures of the monilia to ultra-violet rays for 1 and 5 minutes was without effect, but exposure for 15 and 30 minutes resulted in temporary microscopical and macroscopical changes. The monilia is killed by the action of 65 per cent. alcohol for 2 minutes, corrosive sublimate 1 to 1,000 for 5 minutes, and 4 per cent. formaldehyde for 5 minutes, but permanganate of potash 1 to 1,000 for half an hour has no effect.

P. T.

KUROTCHKIN (T. J.) & CHU (C. K.). **Bronchomoniliasis : Serological Studies on a Case.**—*Nat. Med. Jl. China.* 1929. Aug. Vol. 15. No. 4. pp. 403-409. With 4 figs. on 2 plates. [3 refs.] [Peking Union Med. College, Peking, China.]

A fungus, provisionally classified as *Monilia tropicalis*, was cultivated from the sputum of what appears to have been a case of fatal bronchomoniliasis. The cultures, when inoculated intraperitoneally or intravenously into rabbits, guineapigs and hamsters, caused death from mycotic septicaemia in 24-48 hours. With the patient's serum positive complement fixation reactions were obtained with an antigen consisting of an alkaline extract of washed monilia cells, and, more strongly, with antigen consisting of the soluble specific substance obtained by 3 precipitations of the alkaline extract with 95 per cent. alcohol. Specific precipitin reactions of low sensitivity were given by adding the alkaline extract and alcohol precipitate to the patient's serum.

P. T.

URBAIN (Achille). Sur la durée de vitalité et de virulence de *Trichophyton gypseum* incorporé à des litières. [**Growth and Virulence of *Trichophyton gypseum* on Litter.**].—*C.R. Soc. Biol.* 1928. Vol. 99. No. 38. pp. 1917–1919. [1 ref.]

The litter in two guinea pig cages was sprayed with an emulsion of cultures of *Trichophyton gypseum* and then set aside for long intervals. Five months later virulent cultures of *T. gypseum* were recovered from one cage, and guinea pigs with scarified backs became infected with typical ringworm when placed in it. Similar results were obtained with the second cage after an interval of nine months.

P. T.

REISS (F.). Caractères morphologiques et biologiques de certaines espèces de *Monilia*. [**Morphological and Biological Characters of Certain Species of *Monilia*.**].—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 506–510. With 6 figs. on 1 plate. [4 refs.]

Old strains of *Monilia krusei*, *M. tropicalis*, *M. macedoniensis*, *M. pinoyi*, *M. pseudotropicalis*, and *M. metalondinensis* were investigated. It was found that in their biological reactions every species, except *M. pseudotropicalis*, gave results differing from those observed by CASTELLANI in the production of acid or gas in certain carbohydrates or in the action on litmus milk. Nevertheless, the author concludes that these are minor and unimportant variations, and that the biological reactions afford an excellent means of differentiating different species of *Monilia*.

P. T.

DE ALMEIDA (Floriano Paulo). Incidencia da blastomycose no Brasil. [**Incidence of Blastomycosis in Brazil.**].—*Bol. Biol. S. Paulo.* 1929. June 30. No. 15. pp. 23–27. [Microbiol. Lab., Faculty of Med., S. Paulo.]

The author has met with 202 cases of blastomycosis in the different States. Statistics are given of the nationalities of 188 of these, and of the ages of 177. Looking up the figures, he found that the numbers of cases occurring in S. Paulo were high, but in the remaining States much lower, and many cases doubtless go unrecorded. The value of statistics based on so small a number is therefore slight.

H. Harold Scott.

MAZZA (Salvador) & PARODI (Silvio). Micosis chaqueña producida por el *Pseudococcidioides Mazzai* (Da Fonseca 1928). [**Mycosis due to *Pseudococcidioides Mazzai*.**].—*Prensa Méd. Argentina.* 1929. July 20. 14 pp. With 4 figs. [Inst. of Clin. Surg., Univ., Buenos Aires.]

A fragment of a small growth found post-mortem in an Argentine was sent to the authors' laboratory. The patient had suffered from a pre-laryngeal abscess which was operated upon, but a fistula remained. In sections of the tissue, bodies resembling the *Coccidioides* recorded by POSADAS in 1892 were found. They differed, however, in size and in the shape of the spores and have been named *Pseudococcidioides mazzai*, and placed in "the Family Protomycetaceae, intermediate between Phycmycetaceae and Ascomycetaceae." Photomicrophotographs showing the parasite well are reproduced.

H. Harold Scott.

ABRIKOSOFF (A.). Ueber "Spleno-mykosen," und "Mykotische Splenomegalien." [**On Mycotic Splenomegaly.**].—*Virchows Arch. f. Path. Anat. u. Physiol.* 1929. Vol. 272. pp. 593–612. With 16 text figs. [41 refs.]

From a general review of the recent literature on the controversial subject of mycotic splenomegaly, and from his personal investigation of a number of cases, the author comes to the following conclusions. The various mycelial-like structures incrustated with iron salts found in nodules [Gandy-Gamna] in spleens in certain pathological conditions are in no way connected with fungi. The nodules arise from haemorrhages followed by impregnation and incrustation of degenerated tissue elements with iron salts. In cases where cultures of aspergilli were obtained from spleens, the fungus was present as a secondary infection and was not concerned in the formation of the nodules or in the development of the bodies incrustated with iron. The mycotic origin of splenomegaly is not proved, and, in view of the present knowledge on the subject, it is improbable.

P. T.

FASIANI (G. M.) & OSELLADORE (G.). Essai de reproduction expérimentale des nodules de Gandy-Gamna. [**Attempt to reproduce Gandy-Gamna Nodules experimentally.**].—*Presse Méd.* 1929. Aug. 31. Vol. 37. No. 70. p. 1136. [Surg. Clinic, Univ., Padua.]

A case is described in which two small aberrant spleens were removed from above the left testicle of a boy aged 19. Each of them showed siderotic areas with all the characters of Gandy-Gamna nodules. The normal spleen of the patient was quite healthy. The authors consider that this is proof that Gandy-Gamna nodules may be found in spleen tissue which has no tendency to hypertrophy, and may even be undergoing sclerosis, and they consequently support the view that the nodules are due to degenerative changes in the spleen tissue.

They attempted to produce experimental necrosis of the spleen in cats. Positive results were obtained in two cases out of 50, in animals which had received intrasplenic injections of alcohol together with ligature of the vein of the hilus. In each case, around the point of injection of the alcohol, siderotic areas were present and exhibited all the characters of Gandy-Gamna nodules, including, in some cases, rows of refringent rods which resembled fragmented hyphae.

P. T.

SUR (Tarak Nath). **Actinomycosis Hominis.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 490–495. [1 ref.]

Since 1918 the author has seen 9 cases of human actinomycosis in India. Two of the cases involved the lung, pleura and chest wall; one case the female breast; two cases the right foot; one case the right hand; one case the right cheek and parotid region; one case the left cervical and sub-maxillary glands; and one case the deep muscles of the back. In early stages, before grains are formed, diagnostic characters of actinomycosis are, shooting pains in an inflamed area, with nocturnal aggravation; absence of ordinary pyogenic bacteria; presence of bacillary forms of actinomyces in monophages of the pus when examined in wet films; and the cultivation of actinomyces on agar medium 5–6 days after inoculation.

P. T.

LINCOLN (Mary C.) & GARDNER (Stella M.). **A Case of *Rhinosporidium seeberi* in a Resident of the United States.**—*Arch. Pathology*. 1929. July. Vol. 8. No. 1. pp. 38–45. With 7 figs. [5 refs.]

The second case of *Rhinosporidium seeberi* in the United States is reported. It occurred in a nasal tumour of a man who had never been outside the United States.

P. T.

UNDULANT FEVERS.

SMITH (Theobald). **Undulant Fever : its Relation to New Problems in Bacteriology and Public Health.**—*Medicine*. Baltimore. 1929. May. Vol. 8. No. 2. pp. 193-209. [10 refs.]

This was the De Lamar lecture delivered before the Johns Hopkins University School of Hygiene by the well-known authority who is now Director of the Department of Animal Pathology in the Rockefeller Institute, New Jersey.

The author's standpoint is that of one who is endeavouring to find out from existing data whether or not the bovine type of *Br. abortus* produces undulant fever in man primarily, and not as a secondary invader or graft on some pre-existing pathological state. A brief description is given of the three major races of the *Brucella* group : those of the cow, the pig, and the goat. In the bovine disease the infectious agent is restricted primarily to the pregnant uterus, more particularly to the epithelium of the chorion, and secondarily to the udder ducts. It is pointed out that the foetus suffers not from an actual disease caused by *Br. abortus*, but from a gradual interference with the circulation in contact with the maternal vessels. In the cow's udder the bacteria are probably retained in the residual milk, where they multiply. Calves fed on this milk fail to become infected.

The author then describes the condition to be found in guineapigs following on inoculation with *Br. abortus* (bovine) and points out that by this procedure it is possible to obtain pure cultures of *abortus* when material containing a mixed growth is inoculated. No invasion of the epithelial cells, similar to that in the bovine chorionic membrane, had ever been noted in guineapigs. The suggestion is made that the placental strain is less pathogenic for man than the strains derived from the milk.

With regard to the porcine strains of *Br. abortus*, these are quite definitely more virulent for the guineapig than the bovine variety, in that the lesions are more conspicuous and are subject to softening and abscess formation, and are rather widely distributed in the lymph nodes as well as in the spleen, testicles and limbs. This strain also multiplies readily in unsealed agar tubes. In the author's view the porcine strain is a more recent adaptation to a new host than are the bovine and caprine.

As regards the caprine race, the author is aware of little research concerning its behaviour in the guineapig or of its relation to disease or abortion in goats.

He then considers other factors which may serve to distinguish between the races of *abortus* on morphological, cultural, physiological, pathogenic and serological grounds. The most impressive physiological distinction among the animal races is the relation to CO₂, freshly isolated bovine strains requiring CO₂, or a sealed tube for primary growth, whereas the porcine and caprine require neither.

Dealing with the subject of undulant fever in man, he remarks on the number of cases in America and elsewhere which have come to light in recent years having no connexion whatever with goats or their milk. Twenty-three strains of human origin have been studied

by the author ; 18 from cases in the United States, the remainder from other countries.

There were no CO₂ inhibitions in any of the American cultures when they were received, and the pathogenic activities in guineapigs showed much variation. These could be grouped, roughly, as follows:—

(a) No effect whatever ; no bacteria recovered from spleen. Three strains.

(b) The usual more or less variable enlargement of the spleen ; slight enlargement of lymph nodes ; atrophy of testicles. One strain.

(c) The usual lesions accompanied by small necrotic foci in the spleen and lymph nodes. Four strains.

(d) The usual lesions accompanied by relatively large, or numerous small, necrotic suppurative foci. Ten strains.

As regards class (a), the author remarks that in all his experience of bovine strains he has never failed to infect guineapigs and to recover the organism from the spleen.

Groups (c) and (d) he regards as not bovine, or as bovine modified by passage through swine. The lesions were markedly different from those due to inoculation with bovine strains. Of the many hundreds of guineapigs inoculated in the Department with strains directly derived from cows or with bovine material (macerated chorion, milk, etc.), not one has died.

The author also points out that confusion may arise from the fact that cows inoculated as a preventive with living *Br. abortus* may, and do, pass this modified strain in the milk.

The results of the labours of bacteriologists up to the present may be stated as follows:—

1. Bovine strains or strains not distinguishable from them have been cultured from human patients in a small percentage only of the cases studied.

2. Caprine strains isolated directly from goats' milk need more detailed study.

3. The cultures isolated from man and presumably ingested in cows' milk, but not fitting the bovine type, may have been swine strains introduced into the cow's udder, as are haemolytic streptococci on occasions.

4. The swine type may have been developed in mid-Western States in recent years, due to the enormous development of the swine industry and owing to close association with cows and to the feeding of swine on by-products of the dairy.

On epidemiological grounds it is interesting to note that since so long ago as 1893 the bovine disease has been widespread in the United States, and yet it is only of recent years that cases in man have been reported. An obvious explanation for this would be that the bovine type as excreted in cows' milk is of low pathogenicity for man and fails to produce appreciable disturbance, but can, and does, produce an immunity towards the more virulent types of porcine and caprine origin.

A reference is made to an experiment reported by COOLIDGE. Seven human beings drank one and a half pints of milk daily from infected cows over a period of eight weeks. No febrile states were observed.

The evidence brought together points in the opinion of the author : first, to the stability of the bovine race of *Br. abortus* as isolated directly from bovines, and second, to a number of divergent pathogenic characters shown when the organism is isolated from undulant fever

cases in man. Only a few of these strains have distinctive bovine characters.

Whenever the animal host is known, as the goat and sheep in Europe and the cow and swine in America, an active campaign should be waged to free the herds of the infection.

D. Harvey.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1930. Feb. Vol. 23. No. 4. pp. 559-572 (Sect. of Epidemiol. & State Med. and Sect. of Trop. Dis. & Parasit. pp. 19-32). [5 refs.] **Discussion on *Brucella* Infections in Man and Animals.** [DALRYMPLE-CHAMPNEYS (W.), DUNCAN (J. T.), PUGH (L. P.), and others.]

Captain W. Dalrymple-Champneys, who opened the discussion, spoke mainly from the epidemiological side and referred to the exhaustive Report of the Ministry of Health, for which he was responsible. The evidence to hand justifies a conclusion that cases of *Brucella* infection have been caused by the drinking of infected cows' milk; yet this is not the whole case and one must still ask, "Has this infection been transmitted by drinking the infected milk or by direct contact with the cow, or has an infection originally derived from cattle been transmitted direct from man to man?" As regards the elimination of danger from cattle, pasteurization of milk is only a palliative; he considers that the best method of eliminating the disease from a herd is by the agglutination test and elimination of reactors, and that the use of living vaccine is no longer necessary and is moreover fraught with danger.

Dr. Duncan discussed the problem principally from the bacteriological standpoint. He agreed that the best method of diagnosis was by isolation of the germ, but in numerous cases this may be impossible or unsuccessful and one has then to rely on the agglutination test. Briefly, he considers that there is little reason to believe that non-specific reactions are of common occurrence; on the other hand, latent infections may occur with marked agglutination reaction, but no clinical symptoms. He is also of opinion that, using trustworthy suspensions, a fairly low titre of agglutination may be accepted and that heating of the sera is not necessary and may even reduce specific agglutinins. As regards differentiation of species, he advises the use of three common differentiating methods: (1) the liberation of hydrogen sulphide from media; (2) the bacteriostatic action of certain dyes; and (3) serological distinctions.

Mr. Pugh spoke from the veterinary standpoint and dealt principally with the prophylactic vaccination of cattle with living cultures. He pointed out that the Ministry of Agriculture recommends that when the disease has broken out in a herd the affected animals should be isolated and the remainder tested for agglutination. Reactors are then isolated and treated as a separate unit. If this fails, live vaccine is employed and by this method losses have been very greatly reduced. Mr. Pugh is of opinion that the elimination of *Br. abortus* infection in this country in cattle by isolation and destruction of reactors is economically impracticable and that the risk of producing carriers after vaccination with living cultures is not great.

D. H.

GIORDANO (Alfred S.). *Brucella abortus* Infection in Man. The Intradermal Reaction as an Aid in Diagnosis.—*Jl. Amer. Med. Assoc.* 1929. Dec. 21. Vol. 93. No. 25. pp. 1957-1958. With 2 text figs. [9 refs.] [Med. Lab., South Bend, Indiana.]

The author points out the difficulties in diagnosis of this disease and refers to several cases in his experience in which blood culture was positive, yet the agglutination test was negative. He refers to Burnet's intradermal test, in which the filtrates of broth cultures were used; other workers have used killed salt suspensions of *Brucella* for injection.

In his early work he used the filtrates of broth cultures, but found that the reactions were not of sufficient specific value. On the other hand, using heat-killed salt suspensions, strong reactions occurred in known cases and not in controls. The material used in his investigations consisted of the following: 25 proved cases of undulant fever, 75 tuberculous people, 20 normal people. The suspensions were made from recently isolated strains of *Br. abortus* grown on Huddleson's liver agar for 48 to 64 hours and graded at a density of 1/1,000 on United States Public Health standard. 0.2 cc. was injected intradermally.

A positive reaction appeared, as a rule, in from 12 to 48 hours. A small "boil" formed at the site of injection, with some induration; these boils contained neither pus nor bacteria. A small scar with an area of discolouration may last for some months. A second series of cases, with doses of 0.5 to 0.1 cc., is now in process of trial and gives quite definite reactions.

The 25 cases of undulant fever all gave a positive reaction; of 100 controls only one was positive.

At the discussion on the paper the opinion was expressed that it would not be right to abandon the agglutination test for the intradermal, but that both might be usefully employed in doubtful cases where blood culture had failed.

D. H.

GIORDANO (Alfred S.) & SENSENICH (R. Lloyd). *Brucella abortus* Infection in Man. A Clinical Analysis of Thirty-Five Cases.—*Jl. Lab. & Clin. Med.* 1930. Feb. Vol. 15. No. 5. pp. 421-436. With 6 text figs. [17 refs.] [Med. Lab., South Bend, Indiana.]

This paper and three following (CARPENTER, LYNCH, MEYER, see below) were read at a symposium on clinical pathology with special reference to undulant fever.

Most of the work referred to has been already published by the authors, but certain points were emphasized and these are noted here. A discussion followed the reading of the papers, and it is interesting to note that there was general agreement that the prevalence of undulant fever in the States had first been noted by the bacteriologists, but that now cases were being detected all over the country on clinical grounds, supported by bacteriological evidence. It was hinted, however, that clinical diagnosis, which had at first ignored the disease, was now swinging to the other extreme and cases were being diagnosed as undulant fever which were not really so, thus tending to exaggerate its prevalence.

The authors consider that it is wrong to presume, because *Br. abortus* and *Br. melitensis* are closely related bacteriologically, that therefore they should produce identical clinical symptoms in man. They consider that a further study of *abortus* infection in man in 35 cases emphasizes the relative infrequency of the classical undulant type of temperature curve of *melitensis* infections.

The number of people infected by actual handling of cultures or diseased animal tissues was much less than of those who could only have been infected by drinking milk from infected cows. Five patients were farmers, one a veterinary surgeon, one a mechanic who also raised pigs, and the remaining 28 were in urban occupations and had all consumed raw milk.

The clinical symptoms were very varied; the acute type in the authors' experience is of more common occurrence than the more usually described long-drawn-out chronic type. The cases are classified according to the predominant symptoms and the body tissues attacked. Brief histories are given of typical cases of each type which are classified as septic, arthritic, neurologic, visceral and glandular. The individual symptoms are discussed in detail.

For diagnosis the agglutination reaction is regarded as one of the most reliable aids; successful blood culture was most difficult to obtain in this series of cases.

D. H.

HEGLER (C.). Ueber undulierendes Fieber, insbesondere durch *Bacterium abortus* Bang. [**Undulant Fevers and especially Abortus Fever.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 256-265 (340-349). With 4 text figs. [1 ref.] [St. George's General Hosp., Hamburg.]

The author remarks on the disproportion between the widespread infection of cows with *Br. abortus* and the rarity of cases among human beings and especially children who consume cows' milk. For instance, in Schleswig Holstein between 20 and 30 per cent. of the cattle are infected and 25 cases of Bang disease were diagnosed there in the spring of 1929. Kiel had ten cases and Hamburg seven; six of these were under the care of the author.

A careful clinical description, with temperature charts, is given, and it is noted that the frankly undulant type of fever curve is rare, not nearly so well marked as in *melitensis* infection. Even when fever was high, the general condition was good, the patient lying comfortably with little or no pain and with a good appetite. There was, as a rule, enlargement of the spleen and the liver. Two cases ended fatally; both died of cirrhosis of the liver.

In the author's opinion diagnosis is possible, but not easy, on clinical symptoms alone, but is confirmed by the agglutination reaction. In none of his cases was the bacterium isolated from the blood. In *melitensis* fever there is a shorter incubation period, much greater prostration and general disturbance, sleeplessness, bad headaches, more rapid pulse, more frequent and violent joint pains, neuralgia and orchitis than in *abortus* infections.

He urges the routine testing of all sera sent for examination against *abortus* emulsions.

D. H.

OTERO (Pablo Morales). **Experimental Infection of *Brucella abortus* in Man. Preliminary Report.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1929. Dec. Vol. 5. No. 2. pp. 144–157. With 2 charts. [22 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.] [Summary appears also in *Bulletin of Hygiene*.]

The author records a series of experiments in which various strains of *Brucella* were fed to human volunteers, who were submitted to a detailed clinical and bacteriological examination before the feeding, and were kept under observation in hospital for several weeks thereafter. In all, seven experiments were carried out. In five cases a single feeding was given, but was repeated after two or three weeks when no symptoms developed. Of these five persons, one developed undulant fever eighteen days after the second ingestion of a porcine strain of *Brucella* (Hygienic Lab. 483), and the organism was recovered from the blood on the 5th day of disease. The four persons fed on other strains developed no characteristic symptoms and yielded no positive blood cultures. [The particulars of the four strains employed are disappointingly scanty. One is recorded as "Bovine type Hygienic Lab. 456"; one as "Strain No. 21, School of Tropical Medicine," which is stated to have been an old laboratory strain; one as "Strain isolated in Porto Rico—Porto Rico No. 1"; and one as "428."]

Two further volunteers were given daily feedings until the organisms could be isolated from the faeces by Amoss's method. In one case the bovine strain was employed, without result. In the other case the porcine strain (483) was administered on five successive days. The patient fell ill on the 8th day after the fifth feeding. He developed fever 3 days later and the organism was recovered from the blood on the 5th day of the fever (the 8th day of the disease?). [There are several minor discrepancies in the dates given in the text.]

W. W. C. Topley.

LUSENA (Marcello). Un focolaio di febbre ondulante e di aborto epizootico in Provincia di Padova. Osservazioni ed esperienze sulla variabilità delle Brucelle agli effetti batteriologici e diagnostici. [**A Focus of Undulant Fever and of Epizootic Abortion in Padua.**—*Bol. Istituto Sierotrap. Milanese.* 1929. Nov. Vol. 8. No. 11. pp. 743–759. German summary p. 759. [13 refs.] [Inst. of General Clin. Med., Univ., Padua.]

An interesting series of cases is here presented together with evidence in favour of FAVILLI's thesis of the transformation of the true *Br. melitensis* to *paramelitensis* and possibly *abortus*. Five out of six members of one family, a veterinary surgeon and two others, in all eight individuals, suffered from attacks of fever of an undulant type in Creola near Mestrino (Padua), where undulant fever is not known, but abortion among cattle is common. The veterinary surgeon had, shortly before the onset of his illness, attended to an aborting cow, and other cows belonging to the affected family had also aborted. The chief distinctions between the organisms are given as follows: Typical *Br. melitensis* shows a maximum agglutinability to specific serum, negative to non-specific; atypical *melitensis* is less agglutinable with the former and also gives positive non-specific agglutination; *Br. paramelitensis* gives agglutination slight or nil with specific serum and up to a high titre with non-specific. *Br. paramelitensis* has also a

marked anticomplementary action. The author is convinced that by age this transformation from left to right in the scale takes place in the course of a few days. The organism isolated in Mestrino appeared to be a typical *Br. melitensis*; after 30 days it gave the reaction of *Br. paramelitensis*, but after 4½ months those of an intermediate stage, showing that the shift can also occur in the reverse direction.

H. Harold Scott.

PIVA (Giuseppe). Distribuzione e frequenza della febbre di Malta (febbre ondulante) in Provincia di Bologna. [**Distribution and Prevalence of Undulant Fever in the Province of Bologna.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Dec. 1. Vol. 10. No. 12. pp. 594–600. With 1 map in text. English summary (6 lines) p. 600. [Inst. of Trop. Path., Univ., Bologna.]

In the three years 1924–27 Dr. SARTORI reported 77 cases of undulant fever, and between January 1st, 1927, and the end of December, 1928, the author saw another 86 cases. Many of the patients had been in contact with cows which had aborted; others had partaken of milk or milk products from such cows. Most were between 18 and 50 years of age, but one was a child of 7 years, and in one instance a family of nine persons was attacked. Of the 86, 60 were men, 25 women, and one a child. Diagnosis was made by agglutination, which was positive up to 1:1,000 with both *Brucella melitensis* and *Br. abortus*.

H. Harold Scott.

ROGER (Henri). La neuromélitococcie. [**Nervous Complications of Undulant Fever.**]—*Marseille-Méd.* 1929. Nov. 15. Vol. 66. No. 32. pp. 589–590.

——. Les complications cérébrales de la mélitococcie.—*Ibid.* pp. 591–601. [2 refs.]

——. Les complications médullaires de la mélitococcie.—*Ibid.* pp. 602–616. [9 refs.]

—— & ALBERT-CREMIEUX. La radiculonévrite mélitococcique avec xanthochromie et réaction albuminocytologique intense du liquide céphalorachidien.—*Ibid.* pp. 617–634.

—— & RAYBAUD (Antoine). La sciatique mélitococcique.—*Ibid.* pp. 635–645. [15 refs.]

This number of the *Marseille-Médical* is devoted to neurology and deals with the nervous complications of *Br. melitensis* septicaemia. In a foreword the authors point out how much more common undulant fever is in the south of France now than before the war. A study of several cases of recent years has compelled them to admit a neurotropism of the micrococcus not previously suspected. In the papers presented the cerebral, the spinal, nerve root and sciatic complications are passed in review.

In the first paper M. Henri Roger describes several cases which showed some form of nervous symptom of central origin. The first case had occasional aphasia followed by facial paralysis. The second case had very marked wasting of groups of muscles, difficulty

in walking and vertigo; the diagnosis was cerebral arteritis due to *melitensis*. Case 3 showed paraplegia with involvement of sphincters and positive Babinski sign.

Then follows a description of three cases of undulant fever in which the spinal cord was involved, and two in which there was inflammation of the nerve roots, with marked paralysis of the lower limbs, without involvement of sphincters.

As regards infection of the sciatic nerve during or following an attack of, undulant fever, the authors quote the literature. One patient, a railway employee who had been carrying on with his work although out of sorts, developed an acute attack of sciatica in the right leg; he was found to be suffering from undulant fever, probably of some months' duration; the agglutination reaction for *Br. melitensis* was strongly positive.

D. H.

LISBONNE (M.) & BALMÈS. Chimiothérapie de la mélitococcie expérimentale par les dérivés de l'acridine. [**Treatment of Experimental Brucella Infection by Acridine Derivatives.**—*C.R. Soc. Biol.* 1929. Nov. 22. Vol. 102. No. 31. pp. 573-574.]

The drug employed in these experiments was gonacrine. The authors state that it has been shown that undulant fever in man in the south of France is spread by sheep [see this *Bulletin*, Vol. 23, p. 349]; therefore they chose these animals for experiment. Three sheep were given an intravenous dose of 10,000 living bacteria. One died 25 days later with pneumonia, the two others showed no clinical signs or symptoms of disease, but blood cultures at fortnightly intervals were positive. The agglutination tests, negative at the commencement, became positive later on in a dilution of 1/100 to 1/1000. No other sign of infection could be detected during three months' observation.

Gonacrine injections, which produced somewhat violent reactions, were given, and, although the blood culture remained positive, yet milk culture, which had been positive, became negative after four injections of 1/100 solution. The dose employed was 1 cgm. per kgm. body weight.

The authors apologize for the paucity of their observations due to lack of laboratory facilities, but consider that their results justify further work on the same lines.

D. H.

HARDY (Albert V.), HUDSON (Margaret G.) & JORDAN (Carl F.). **The Skin as a Portal of Entry in *Br. melitensis* Infections.**—*Jl. Infect. Dis.* 1929. Oct. Vol. 45. No. 4. pp. 271-282. [25 refs.] [Dept. of Preventive Med. & State Hyg. Labs., Univ. of Iowa, Iowa City.]

It has been suggested that infection with undulant fever in persons employed in packing factories may take place through abrasions of the skin of the hands or even through the normal skin. Moreover, on farms it has been noted that the persons who contract undulant fever are the men who handle the infected stock, even though those who escaped infection drank more raw milk.

In the authors' experimental work guineapigs were used. Two tests of infection were employed, the development of agglutinins and the recovery of the organism post-mortem. Two varieties of *Br. abortus* were used, both isolated from human cases. One, identified as a porcine strain, gave very marked lesions in guineapigs; the patient from whose blood it had been isolated was a farmer 20 out of whose 21 sows had aborted. The second variety was of bovine origin, gave the characteristic growth of the bovine strain and required an atmosphere of CO₂ for initial culture. It had little effect on guineapigs.

In one group of guineapigs an area of skin was shaved and abraded, in another group the skin was shaved without abrasions and in another the hair was merely clipped; the infecting dose was applied by means of a glass rod. It was found that guineapigs which did not show agglutinins in their blood, if killed subsequently, showed no evidence of infection. The two strains, porcine and bovine, did not show any marked difference in ability to infect. Of the guineapigs with abraded skin 100 per cent. were infected in both series; in those with shaved skin but not abraded 95 per cent. were infected by the porcine strain and 82 per cent. by the bovine; in those in which the hair was only clipped 81 per cent. porcine and 73 per cent. bovine, were infected.

In a further series of guineapigs fed by the mouth with infective material 17 per cent. of the porcine series were infected and 33 per cent. of the bovine. It was thus shown that infection was more readily obtained through the skin than by the oral route.

An epidemiological study of the disease was made in several pork factories, and it was clearly brought out that practically all the cases of undulant fever occur in the men who are actually engaged in the handling of the freshly cut tissues of the pig, although it was not possible to determine whether this infection took place through abrasions or through the normal skin.

D. H.

HUDDLESON (I. Forest) & HALLMAN (E. T.). **The Pathogenicity of the Species of the Genus *Brucella* for Monkeys.**—*Jl. Infect. Dis.* 1929. Oct. Vol. 45. No. 4. pp. 293-303. [4 refs.] [Michigan Agric. Experiment Station, East Lansing.]

The authors think that BURNET's failure to infect monkeys with *Br. abortus* may have been due to the small number of animals or to the use of animals naturally resistant. They employed freshly isolated strains of bacteria from different hosts and from infective material, such as freshly drawn milk or the aborted foetus.

The monkeys used were all *Macacus rhesus*. They were exposed to infection by the oral administration of infective material; infection was gauged by the appearance of agglutinins in the blood and by the isolation of the organism from the heart blood. If infection did not result from a single exposure the dose was repeated several times. Protocols of all the experiments are given and the results are tabulated.

Seventeen monkeys were exposed to infection with *Brucella* strains, eight of the bovine variety, seven porcine and four *melitensis*.

The experiments indicate that *abortus* (bovine) does not possess a high degree of virulence for monkeys: only after repeated feedings of infective milk was infection produced in one of three. *Abortus* strains from human cases produced slight infections in two monkeys, no infection in the third. On the other hand, *Br. abortus* of porcine origin

showed a high degree of virulence for monkeys, one exposure being sufficient to infect each of the seven monkeys used. In fact, this species appeared to be even more virulent for monkeys than *Br. melitensis*.

D. H.

MEYER (K. F.) & EDDIE (B.). **Further Studies on the Pathogenicity of *Br. abortus* and *Br. melitensis* for Monkeys.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Dec. Vol. 27. No. 3. pp. 222-224. [George Williams Hooper Foundation for Med. Research, Univ. of California, San Francisco.]

- In this investigation 48 cultures of the *Brucella* group were employed and 74 Rhesus and 14 *Cynomolgus* monkeys. Oral administration in single doses of *Br. abortus*, variety "bovis," produced non-febrile infections in 24 Rhesus monkeys, followed by the production of very definite agglutination reactions in the serum. Blood cultures were negative, but that these were true infections was shown when monkeys were sacrificed from the 34th to the 52nd day, when the infecting organism was readily recovered from the tissues. Very large doses were necessary—from 7 to 400 millions and in some experiments many billions. The larger the dose the more pronounced is the serum reaction. The incubation period, i.e., the period that elapsed before agglutinins appeared in the blood, varied from 9 to 30 days. A cutaneous application of 20,000 bacteria has resulted in infection.

The type "suis" of bovine or porcine origin, on the other hand, in doses of 100 million bacteria by the mouth, produced a febrile disease, with anatomical lesions resembling those of a *Br. melitensis* infection. The milk of the cow which supplied one of these "suis" strains had been consumed by a group of people without any bad effects.

Tunisian strains of *Br. melitensis*, fed to monkeys in doses of 100 million bacteria, gave rise to a febrile disease characteristic of this group of organism.

Three *Br. abortus* type "suis" strains isolated from cases of fever in man did not exhibit any striking pathogenicity or marked febrigenic properties, either by feeding or by cutaneous or intravenous injection.

The ingestion of heat-killed *abortus* bacilli, with or without bile, is antigenically ineffective in monkeys or in rabbits.

Ten per cent. of the monkeys tested possessed a marked immunity against *Brucella* infections by the alimentary tract.

Animals which react to the oral administration of virulent *abortus* organisms with moderate and usually transitory serum reactions resist subsequent feeding infections with *Br. abortus*, "bovis" or "suis," but not with Tunisian *Br. melitensis*.

Continuous ingestion of small numbers of *abortus* may lead to mild unrecognized "silent" (inapparent), yet immunizing, infections.

D. H.

CARPENTER (Charles M.) & BOAK (Ruth). **The Laboratory Diagnosis of Undulant Fever.**—*Jl. Lab. & Clin. Med.* 1930. Feb. Vol. 15. No. 5. pp. 437-443. [7 refs.] [Dept. of Comparative Path. & Bact., Cornell Univ., Ithaca, N.Y.]

Carpenter discusses the question of laboratory diagnosis and the differentiation of the types of organisms. Although investigators have suggested various methods of differentiating *melitensis* from *abortus*,

in his experience, apart from the agglutination absorption test, these methods cannot be depended upon. By the use of the absorption test it has been shown that the majority of the cases in America are due to *abortus* infection.

The author then discusses the laboratory procedures in establishing a positive diagnosis, taking these in the following order :—

1. Agglutination test.
2. Complement fixation test.
3. Bacteriological examination of the blood.
4. The absorption test.
5. The blood count.

The most interesting part of his paper is a description of his methods of carrying out the bacteriological examination of the blood.

It is recommended that 20 cc. of blood be taken as early in the fever as possible and when the temperature is high ; no anti-coagulant should be used. A meat infusion agar (preferably made from liver) of a pH of 6·8 or 7 should be employed. Four tubes of slant agar may be inoculated and two plates poured to which 2 cc. of blood are added. Two of the slants and one of the plates are incubated in a jar in which 15 per cent. of the air has been replaced by 10 per cent. of carbon dioxide ; one of the slants is sealed with wax and placed along with the other slant and plate in the incubator under normal conditions. Cultures should not be discarded for 20 days as growth may be very slow. The remainder of the blood is injected into two guinea-pigs.

A later method is to inoculate a flask of liver broth with the blood and inoculate a guineapig from the culture after 3 days' incubation.

D. H.

LYNCH (Frank B.) & CALLAN (Annette M.). **Some Observations on the Agglutination of *Br. abortus*.**—*Jl. Lab. & Clin. Med.* 1930. Feb. Vol. 15. No. 5. pp. 444–446. [4 refs.] [William Pepper Lab. of Clin. Med., Univ. of Pennsylvania, Philadelphia.]

During a period of eighteen months when all sera sent in to the laboratory for diagnostic tests were put up against typhoid, paratyphoid and *abortus* emulsions, seven gave a strong positive reaction for the last. Two of these sera were from cases in the hospital and five were sent in for diagnosis from outside.

The culture was selected by tests with positive sera and subcultured on 3 per cent. glycerine, 0·1 per cent. glucose agar. Several large slopes of this medium were inoculated and incubated for 72 hours ; the growth was then washed off with sterile saline and killed by heating to 55° for 45 minutes and filtered through wool. The emulsion was standardized by comparison with a staphylococcal suspension of three billion organisms per cc. It was stored in the ice box for future use. The agglutination test was carried out in a water bath at 55° C. for two hours

The authors contend that by the use of an antigen prepared in this way they got very constant and specific results.

D. H.

MEYER (K. F.) & EDDIE (B.). **Notes on the Bacteriology of the *Brucella* Group.**—*Jl. Lab. & Clin. Med.* 1930. Feb. Vol. 15. No. 5. pp. 447–456. [27 refs.] [George Williams Hooper Foundation for Med. Research, Univ. of California, San Francisco.]

The authors give a résumé of recent work on the differentiation by the agglutinin absorption test and find that by its use many strains,

especially of European origin, cannot be "placed." The test for pathogenicity in animals is of value in differentiating porcine *abortus*, but may give confusing results. Some strains of caprine *melitensis* may give porcine results in guineapigs, and some porcine strains may show little or no pathogenicity for guineapigs. The thermo-agglutination tests also they found unsatisfactory. Studies on the nutritive substances and growth accessory factors, the effect of salts and nature of enzymes, are now being undertaken, but so far have not furnished definite proof that biologic means may distinguish *Brucella* types. The work of McALPINE on metabolic differences, such as the use of glucose and the necessity for CO₂, and HUDDLESON's work on growth differences by means of dye media are then discussed and have been repeated by the authors; over 130 cultures of *Brucella* have been tested against dyes and have been classified as follows:—

Twenty cultures from bovine and one from porcine sources in Switzerland fall into the "bovis" class according to their reaction with dyes. Of eight cultures obtained from Germany as true *abortus* three behave like *melitensis* and five like bovis types. Of the four Hungarian cultures one behaves like a *melitensis*. Three Italian strains were all classified as bovis types.

Human Cultures.—In general, strains classified as *melitensis* reacted as such on dye media; those identified by agglutinin absorption tests as *abortus* were either linked with the "suis" or with the bovis type. With one exception 20 strains from Iowa are "suis" strains; some of the New York strains fall into the same category, while the Michigan cultures are mostly bovis types. Twelve Denmark strains react like bovis and four from Tunis like *melitensis* types.

The glucose utilization tests the authors found to be disappointing on the whole, but, speaking generally, the feeble biochemical activity of the majority of *abortus* strains contrasts sharply with the vigorous carbohydrate activity of certain porcine and *melitensis* strains.

Then follows an account of experiments on monkeys recently carried out. The general conclusion that *Br. abortus* is definitely less pathogenic for monkeys than *melitensis* was confirmed. The ingestion of heat-killed *abortus* bacilli with or without bile was found to be antigenically ineffective in monkeys and rabbits.

The authors maintain that further work is necessary and this is in hand. Final conclusions cannot be drawn on the evidence now available.

D. H.

FAVILLI (G.). Sur l'utilité d'associer la thermo- à la séroagglutination dans le sérodiagnostic de la fièvre ondulante. [**Relation of Thermo- to Sero-Agglutination in Diagnosis of Undulant Fever.**—*Bol. Sezione Ital. Soc. Internaz. di Microbiologia*. 1929. Jan. Vol. 1. No. 1. pp. 21-23. [3 refs.] [Inst. of General Path., Univ., Florence.]

The author points out that one great difficulty in carrying out agglutination tests with *Br. melitensis* is that reliable strains may not be to hand.

One method of avoiding this is to employ controls with sera of known titre, but this also may not eliminate all sources of error.

The author suggests the use of the following simple procedure, utilizing the phenomenon of thermo-agglutinability. He has found

invariably that the degree of thermo-agglutinability is inversely proportional to the degree of agglutinability by immune sera. It follows that one should select for agglutination tests those strains which show no trace of thermo-agglutinability. The technique is simple. Emulsions of the various strains are prepared in normal saline and heated in the water bath at a temperature just over 80° C. for 15 to 20 minutes. The emulsions are then examined by the naked eye and a loopful is also examined in the agglutinoscope. All strains showing even a trace of clumping should be rejected, and the strain which gives a homogenous emulsion should be retained for use in agglutination tests.

D. H.

WIGMORE (J. B. A.). **Note upon the Production of Brucella Agglutinins.**
—*Jl. Roy. Army Med. Corps.* 1930. Jan. Vol. 54. No. 1.
pp. 5-10. [6 refs.]

The author refers to the conflicting opinions regarding the value of the agglutination and absorption of agglutinin tests in differentiating infections or strains of the Brucella group. With a view to assisting in the diagnosis of cases he set himself to find:—

1. An anti-serum which would agglutinate all available strains of the group.
2. Three anti-sera which would agglutinate all strains of *melitensis*, *paramelitensis* and *abortus* respectively.
3. A strain from which a suspension could be made which would be agglutinated by all sera of Brucella-group infections
4. Three strains, i.e., one of *melitensis*, one of *paramelitensis* and one of *abortus*, of which suspensions could be made which would each be agglutinated by all anti-sera of their homologous species.

Of these, for general purposes, 2 and 4 are most to be desired.

With this end in view, four strains of *melitensis*, three of *paramelitensis* and three of *abortus* were taken, and for each strain a high titre rabbit serum was obtained by graduated intravenous doses of killed broth cultures. Agglutinable cultures were also prepared by repeated sub-culture in broth and by the final addition of formalin to the standardized emulsions of a density comparable to those issued by the Oxford Standards Laboratories.

A series of comparative agglutination tests was made with:—

1. The sera of the ten rabbits as prepared.
2. The Oxford standard sera for *melitensis* and *abortus*.
3. The sera from two human cases of Brucella infection.

These were tested against the following cultures:—

1. Six strains of *melitensis*.
2. Three strains of *paramelitensis*.
3. Seven strains of *abortus*.
4. The Oxford standard cultures of *melitensis* and *abortus*.

The mixtures were incubated at 55° C. for 4½ hours and then read; dilutions lower than 1/125 were not employed.

The results, given in a table, were remarkable in that the sera of the human cases showed greater agglutinating power than did the sera of the immunized rabbits; also the serum of a rabbit immunized with a specific strain may not agglutinate this strain, but may agglutinate other strains of the same or closely allied species. It follows, therefore,

that a serum prepared by immunizing a rabbit with any killed strain of *Brucella* group may fail to agglutinate an organism recovered from a case of undulant fever.

It is proposed now to immunize rabbits with living cultures, in the hope that these may produce a more active response.

D. H.

NODA (Magoichi). **On the Optimum Hydrogen Ion Concentration in Acid Agglutination with the *Brucella* Group.**—*Eisei Densenbyoshi* (*Jl. Hyg. & Infect. Dis.*). 1929. June. Vol. 25. No. 6. [Summarized in *Japan Med. World.* 1929. Sept. 15. Vol. 9. No. 9. pp. 296–297.]

The author refers to work already published claiming that the determination of the optimum hydrogen ion concentration in acid agglutination may serve as one means of differentiation between *Brucella* strains. ECKER and SIMON have already applied this test and reported that there was no difference in the reaction between *abortus* and *melitensis*. The author repeated these experiments with four strains of Bang's organism and one of *Br. melitensis*, and found that the optimum hydrogen ion concentration and the degree of the reactions were practically identical for both organisms.

D. H.

DE ANTONI (Vittorio). **Trasformazioni in relazione allo sviluppo e con agenti chimici, nei batteri della specie *Br. melitensis*.** [**The Effect of Growth and of Chemical Agents in changing the Characters of *Brucella melitensis*.**]—*Bol. Istituto Sieroterap. Milanese.* 1929. Dec. Vol. 8. No. 12. pp. 787–800. German summary pp. 800–801. [1 ref.]

The author having noticed, in common with others, that *Br. melitensis* seemed to undergo spontaneous alterations, such as acquiring non-specific agglutinability, carried out a series of experiments to test whether this resulted from special substances in the medium itself or from the products of bacterial growth. He used three strains, one from the Milan Serotherapy Institute, one from Padua, and a Pasteur strain supplied from the Pathological Institute, Florence.

He found that prolonged growth in broth led to gradual change from typical *Br. melitensis* to *paramelitensis*, specific agglutinability diminished and non-specific increased. He next varied the proportions of peptone and salt and made up three dilutions by addition of the meat extract, of normal saline, or of distilled water. Development was greatest with the first, least with the last diluent. With peptone, between the limits of 5.0 and 0.4 per cent, growth was normal, beyond either limit it was impeded and a strength of 20 per cent. killed the organism. Varying the salt, he obtained normal growth between 1.0 and 0.3 per cent.; greater or less amounts than these were inimical, and at 3 per cent. or over the organisms died. He observed that the rapidity and intensity of the change to non-specific agglutination varied directly with the luxuriance of growth; the heavier the growth the more rapid the change, from which he infers that it depends on substances formed by the bacilli themselves. Lastly, the addition of drugs such as quinine or plasmochin in small quantities caused the *paramelitensis* characters to appear much more rapidly (within 5 days). Since this change occurs *in vivo* as well as *in vitro*, if patients present themselves with symptoms suspicious of undulant fever and the agglutination reaction is negative, it may be that they have a short time previously been taking quinine or plasmochin and enquiry should be made with this in mind.

H. Harold Scott.

MCALPINE (James G.), PLASTRIDGE (Wayne N.) & BRIGHAM (George D.). **Studies on the Metabolism of the Abortus-Melitensis Group. 5. Factors influencing Sugar Utilization.**—*Jl. Infect. Dis.* 1929. Dec. Vol. 45. No. 6. pp. 485-489. [2 refs.] [Agric. Experiment Station, Storrs, Connecticut.]

The senior author and SLANETZ have shown in a previous paper [this *Bulletin*, Vol. 25, p. 517] that when first isolated from the human or animal body, the porcine, human and *melitensis* strains are capable of utilizing at least 3 per cent. of the available glucose, while the bovine strains of *Br. abortus* use little or no sugar in their metabolism. It has now been found that if the sugar-utilizing strains are grown on plain Fairchild agar for many generations, the property of destroying glucose may be lost. Growth on a liver-infusion agar tends to restore the glucose-utilization property, but this recovery is only transient. However, after three transfers in liver broth a very heavy growth was obtained with pellicle and sediment. The name "mucoid forms" was given to such strains and in these the glucose-utilizing power is restored. The "mucoid forms" of the bovine strains tested did not utilize glucose.

D. H.

FICHERA (S.) & MAUGERI (F.). Untersuchungen über Immunisierung gegen Mittelmeerfieber. VI. Mitteilung. Ueber die Toxizität verschiedener Impfstoffe gegen Mittelmeerfieber. [**Immunization against Mediterranean Fever. Toxicity of Various Vaccines.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 3/4. pp. 352-356. With 2 graphs in text. [4 refs.] [Med. Clinic, Univ., Catania.]

The authors refer to previous studies on the subject carried out by SANFILIPPO and others in the same laboratory. The cultures were the same as were used previously, but mice and rats were employed instead of goats. The vaccines were prepared as usual by washing off the growth on agar cultures or plates, but various methods of killing the bacteria were employed. The vaccines were then injected into mice and rats and the minimal lethal dose estimated. The various agents employed were heat (60° C. for 2 hours), ether, peroxide of hydrogen, carbolic acid, formalin, sodium fluoride, chloroform, chloroform vapour, yatren and lugol solution. With mice it was found that the most toxic preparations were those treated by carbolic acid, chloroform and formalin; slightly less toxic were the heat, ether and fluoride killed; but the least toxic of all was the yatren-treated solution—this was eight times less toxic than the carbolic.

In rats similar results were obtained, although the differences were not so marked; formalin and chloroform produced the most toxic vaccine and chloroform vapour and yatren the least toxic.

D. H.

RODENWALDT (E. R. K.) & COHEN (A. J.). Febris undulans (Malta koorts) in Nederlandsch-Indië. [**Undulant Fever in Dutch East Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Oct. 1. Vol. 69. No. 10. p. 1014.

A short note, simply stating that a case of febris undulans was seen at Maland (Java), being the first in the Dutch East Indies. In a postscript a second case is mentioned. A detailed report—if possible with epidemiological data—is to be expected.

W. J. Bais.

BETHOUX (L.). Fièvre de Malte traitée et guérie par des injections intra-veineuses de trypaflavine. [**Undulant Fever treated by Intravenous Injections of Trypaflavin.**].—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1930. Feb. 17. Year 46. 3rd Ser. No. 5. pp. 206–210. With 1 chart in text. [4 refs.]

The illness began on March 1st. The patient was admitted on March 18th and *Br. melitensis* isolated from blood on April 10th. Trypaflavine injections, 10 cc. of a 1 per cent. solution, were given on April 11th, 13th, 16th and 23rd. On April 16th the temperature fell and the patient rapidly improved and left hospital on May 20th. The author recommends a trial of this drug.

D. H.

JOHNSSON (Vera). Un cas de "febris undulans" de Bang avec complications nerveuses.—*Acta Med. Scandinavica*. 1929. Oct. 17. Vol. 72. No. 2. pp. 93–103. With 1 text fig. [2 pages of refs.]

STIEBEN (W.). Zur Frage über die Verbreitung des Febris undulans in Turkestan.—*Pensée Méd. d'Usbéquistan et de Turquemenistan*. 1930. Feb. No. 5. pp. 58–59. [3 refs.] [In Russian. German summary p. 99.]

DENGUE AND PAPPATACI FEVER.

SIMMONS (James Stevens), ST. JOHN (Joe H.) & REYNOLDS (Francois H. K.). **Dengue Fever transmitted by *Aedes albopictus*, Skuse.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 17-21. [9 refs.] [Bureau of Science, Manila, P.I.]

—, — & —. **Transmission of Dengue Fever by *Aedes albopictus*, Skuse.**—*Philippine Jl. Sci.* 1930. Feb. Vol. 41. No. 2. pp. 215-231. With 2 charts, 1 fig. & 1 plate. [12 refs.] [Bureau of Science, Manila, P.I.]

In Manila *Aedes albopictus* (Skuse) is, next to *Aedes aegypti*, the most common mosquito. It was present in very large numbers during the last epidemic of dengue. So far, although it has been suggested that this common Oriental mosquito may be a carrier of dengue, experimental proof is lacking. In the author's laboratory, during the investigation, this mosquito was nicknamed the "one striper," in view of the single broad longitudinal white stripe on the thorax which distinguishes it from *A. aegypti*. It has similar breeding habits to *aegypti* and was readily bred in the laboratory, so that a supply of "clean" mosquitoes was easily obtained. Lot 29 of these insects was fed on a human volunteer in the first day of an attack of dengue and thirteen to twenty-two days later on five normal individuals. The number of mosquitoes in the box was gradually reduced from 12, 10, 8, 3 to 1, and infection resulted in each case. Further laboratory-bred mosquitoes were fed on the man in whom dengue had been produced by the single insect, and they again produced an attack of dengue in two fresh volunteers. Abstracts of the cases, which were all typical, are given.

The results obtained clearly show that *A. albopictus* is just as efficient a transmitter of the virus of dengue as is *A. aegypti*.

D. Harvey.

ST. JOHN (Joe H.), SIMMONS (James Stevens) & REYNOLDS (Francois H. K.). **Transmission of Dengue Virus from Infected to Normal *Aedes aegypti*.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 23-24. [Bureau of Science, Manila, P.I.]

—, — & —. **Transmission of the Virus of Dengue Fever from Mosquito to Mosquito.**—*Philippine Jl. Sci.* 1930. Mar. Vol. 41. No. 3. pp. 381-385. With 2 text figs. & 2 figs. on 1 plate. [Bureau of Science, Manila, P.I.]

By the use of a special technique it has been possible to infect normal *Aedes* mosquitoes by feeding them on a mixture of macerated dengue-infected *A. aegypti* and normal blood. The mixture was placed underneath a taut membrane formed by the skin of an exsanguinated guineapig. The whole was warmed and placed in the cage with the normal mosquitoes; these insects fed readily. Later the same mosquitoes were fed on volunteers and produced in them typical attacks of dengue. Citrated blood of dengue cases used in the same way also produced infection in mosquitoes. The authors suggest that their

method of infecting mosquitoes may be usefully employed in other diseases and for the preservation of virus. [A similar method of infecting tsetse flies was employed many years ago.]

D. H.

MILLOUS (Pierre). Note sur les caractéristiques cliniques d'une épidémie de dengue en 1927 dans une province de Cochinchine. [**Clinical Characters of a Dengue Epidemic in Cochin China.**]—*Ann. de Méd. et de Pharm. Colon.* 1929. July-Aug.-Sept. Vol. 27. No. 3. pp. 422-435. [1 ref.]

This is a very interesting and careful report of a sudden epidemic of dengue in the year 1927. The author in the course of his practice saw no fewer than 1,000 classical cases. The main points of this thesis are that this sudden and explosive epidemic was a new thing in that part of the world, and that there had been no such outbreak for at least 20 years. Although seven-day fever and "fever of the ports" are always to be met with, the author maintains that these are separate and distinct diseases and easily distinguished clinically from dengue. He cites three main points of difference: Dengue is a disease of two rashes, seven-day fever of only one; dengue produces most violent and severe bone and joint pains, much more severe than in seven-day fever; and the temperature curve of dengue is most irregular, whereas the curve in the two other diseases is a regular one.

Other special points noted were that people who carefully protected themselves by mosquito nets at night and by clothing in the day time were just as liable to contract the disease as those who did not so protect themselves, and the epidemic of dengue began before mosquitoes were prevalent and before the malarial season commenced, and ceased earlier. Cases were not more numerous in the country where mosquitoes abounded than in the towns where there were few.

[It is not stated whether the author is discriminating between the different species of mosquito.]

There follows a full and very elaborate clinical description of the disease derived from a close study of 1,000 cases. There were no cases at all in the following year, although conditions remained as before.

D. H.

POGGI (Igino). La dengue, con speciale riguardo all'epidemia estivo-autunnale sviluppatasi in Rodi nel 1928. [**The Epidemic of Dengue in Rhodes in 1928.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Oct. 1. Vol. 10. No. 10. pp. 480-499. With 1 text fig. English summary p. 500. [Inst. of Trop. Path., Univ., Bologna.]

This paper gives a very full account of an epidemic of mild dengue in the Island of Rhodes, which occurred in the summer and autumn of 1928. The author is convinced that infection had been introduced from outside, probably Athens. He relates the clinical and statistical data and is convinced that by rigid prophylaxis (protection of sick and healthy, destruction of mosquitoes, etc.), it is possible to limit and even to check altogether an epidemic of dengue. In addition to such measures he recommends the destruction of all ectoparasites (lice, fleas, etc.), as it is possible that these insects may convey the disease direct from the sick to the healthy.

D. H.

ARAVANTINOS (John). **Hospital Observations on Dengue Fever. The Effect on the Kidneys.**—*Jl. Trop. Med. & Hyg.* 1930. Feb. 15. Vol. 33. No. 4. pp. 55–56. [Milit. Path. Hosp., Athens.]

Aravantinos noted that traces of albumin were present in the early stages of the disease in at least 60 per cent. of his patients, and often continued long after the fever ceased. Albuminuria with casts was noted in 30 per cent. of cases and usually indicated an aggravation of a chronic kidney trouble, and in a few cases acute Bright's disease with swelling of the legs was seen. In anyone who is already suffering from kidney trouble the disease is much aggravated by an attack of dengue and the kidney pain may be extreme. Treatment of such cases consists in rest in bed with milk diet and vegetable soup, with exhibition of theobromine and atropine.

D. H.

KLIGLER (I. J.). **Recent Studies on Dengue Fever.**—*Rev. Prat. Malad. des Pays Chauds.* 1929. Nov. Year 8. Vol. 9. No. 11. pp. 497–500, 503–504. [13 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

A résumé of recent work on dengue fever; the subject is discussed under the following headings: epidemiology, etiology, symptomatology, immunity, transmission to animals, and prevention.

D. H.

PETROV (V. P.). **The Epidemiology of Sand-Fly Fever in Connection with the Biology of Sand-Flies.**—*Pensée Méd. d'Usbéquistane et de Turquemenistane.* Tashkent. 1929. Oct. No. 1. pp. 11–24. With 5 text figs. [94 refs.] [In Russian. English summary p. 102.]

Sandfly fever is known to occur in U.S.S.R., in the Crimea, in the Transcaucasus and in Central Asia; and so long ago as 1878 it had been noted in Turkestan. The author witnessed two epidemics of this disease in 1926 and 1927 in Tashkent. Unfavourable meteorological conditions in 1928 affected the breeding of sandflies in that year and prevented a recurrence. The first cases in Tashkent are usually noticed towards the end of May or beginning of June and three weeks after the appearance of sandflies. Usually the insects vanish with the first cold days in the autumn and sandfly fever also ceases.

D. H.

MEDULLA (Candido). **Sopra alcuni casi di febbri a tipo dengue ed a tipo pappataci osservati in Bengasi nel '29.** (Nota epidemiologica e clinica.)—*Arch. Ital. Sci. Med. Colon.* 1930. Mar. 1. Vol. 11. No. 3. pp. 162–167. [19 refs.] English summary (8 lines) p. 168. [Colonial Hosp., Bengasi.]

SACORRAPOS. **Les dites formes cliniques de la dengue.**—*Rev. Méd. et Hyg. Trop.* 1929. Nov.–Dec. Vol. 21. No. 6. pp. 172–177. [2 refs.]

UNCLASSED FEVERS.

GARNAUDIER & FRÈZE. Sur quelques cas de fièvre exanthématique méditerranéenne. [**Cases of Mediterranean Eruptive Fever.**]—*Rev. Méd. de France et des Colonies*. 1929. Oct. Vol. 6. No. 10. pp. 511–515. With 1 chart in text.

The authors point out that since this disease is no longer confined to the Marseilles area, the interest in it is much more widespread, and therefore they publish these detailed notes of five cases observed by them in Roquebrune-sur-Argens.

Case No. 1 was that of a baby aged 11 months, which had fever and a profuse maculo-papular rash typical of the disease. The mother stated that a few days before the disease commenced she had removed a tick from behind the child's ear; later on a small eschar was noted at this spot. There were no digestive symptoms and no lung symptoms.

In case No. 2 there was a history of a bite by a "flying insect" about eight days before the fever commenced; a very marked "tache noire" developed at the site of the bite, with inflammation of the lymphatics and glands draining the area.

In case No. 3 there was no history of an insect bite, but a marked primary ulcer was seen on the leg.

Case No. 4 also gave a history of a bite by a "flying insect" about eight days before the disease commenced, but no "tache noire" could be found.

Case No. 5 showed a very painful boil on the leg attributed to a prick from a thorn; a general rash appeared a few days later with a typical attack of fever.

Summarizing these cases, the authors remark that the disease, although the patients may have high fever, is a benign one and the general condition remains good. Two of the patients were tuberculous, but there was no aggravation of this infection. The authors are convinced that the disease is due to tick bite, although, on this point, the history of their own cases is contradictory.

D. Harvey.

BÉROS (G.) & BALOZET (L.). Fièvre exanthématique d'été au Maroc. [**Summer Eruptive Fever in Morocco.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 712–728. [Refs. in foot-notes.]

The authors observed in Casablanca a malady which presented the following characters:—

An initial small ulcer or tache noire following, as a rule, the bite of a tick. A maculo-papular rash which appeared from the 3rd to the 6th day. A temperature curve resembling that of typhus and terminating in recovery usually in 2 to 3 weeks.

The disease occurs in the warm season and was most common on the outskirts of the town in places where cattle were grazed and ticks were common. No lice were observed on any of the patients or their contacts and there was no evidence of case to case infection. The Weil-Felix reaction was negative. Inoculation of the blood of patients into guineapigs was also negative.

This picture enables the authors to conclude that the disease observed by them was identical with the exanthematous fever of

Marseilles and fièvre boutonneuse of Tunis. They are also inclined to agree with BURNET and DURAND that this fever is not confined to the Mediterranean littoral and they suggest an analogy between this and the tick fever of South Africa described by SANT'ANNA and NUTTALL in Mozambique in 1911.

D. Harvey.

- i. RAMSINE (S.). Sur l'existence de la forme inapparente du typhus exanthématique chez l'homme. [**Non-Apparent Form of Typhus in Man.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 247-254. With 2 charts. [3 refs.] [Central Inst. of Hyg., Belgrade.]
- ii. NICOLLE (Charles). A propos du mémoire de S. Ramsine sur l'existence du typhus inapparent chez l'homme. [**Comments on Ramsine's Paper.**]—*Ibid.* pp. 255-257. [Summary appears also in *Bulletin of Hygiene.*]

i. The experiments of NICOLLE and LEBAILLY have shown the possibility of an acute disease running its course with the presence of the virus in the cells and tissues of the diseased organism in the absence of any clinical symptom.

Patients without any symptoms may therefore act as reservoirs of the virus and be the source of fresh infections.

During an epidemic of typhus in a colony of workmen living just outside Belgrade, 13 out of 97 healthy persons gave a positive Weil-Felix reaction with the following titres: 1 in 800 (1), 1 in 400 (1), 1 in 200 (6), 1 in 100 (5). With one exception none had had a previous attack of typhus and all remained healthy without showing the slightest rise of temperature. Inoculation of their blood into guineapigs produced typical experimental typhus.

ii. Nicolle emphasizes the importance of Ramsine's paper in which the first description is given of non-apparent typhus in man, his own observations having been confined to its occurrence in the guineapig.

In view of the difficulty in detecting these cases of inapparent typhus, except by laboratory methods, all persons in an active epidemic focus should be regarded as capable of spreading the disease without showing any evidence of it themselves. The same prophylactic measures therefore should be applied to them as to those actually suffering from the disease.

J. D. Rolleston.

MACARTHUR (W. P.), DUDLEY (S. F.) & WHITTINGHAM (H. E.). Tropical Fevers of Short Duration. With Conclusions by GERARDS (J. C.).—*Jl. Roy. Nav. Med. Serv.* 1930. Apr. Vol. 16. No. 2. pp. 113-119.

CARRION'S DISEASE.

MULLER (Henry R.) & TYLER (Joseph R.). **The Effect of the X-Ray on the Nodules of Verruga Peruviana.**—*Jl. Experim. Med.* 1930. Jan. 1. Vol. 51. No. 1. pp. 23–26. With 6 figs. on 1 plate. [Rockefeller Inst. for Med. Research, New York.]

The curative influence of X-rays on various skin lesions in man suggested experiments to ascertain whether the rays applied therapeutically would affect the evolution of verruga nodules in monkeys. This supposition proved to be correct. Experiments showed that the early verruga nodules, when exposed to a single properly graduated dose of X-rays producing merely erythema of the skin, are inhibited in their evolution. Moreover, the skin of the monkey is modified by a single dose of X-rays in such a way that infection of it with *B. bacilliformis* is rendered more difficult. The authors consider that these results justify a trial of X-rays in suitably guarded doses in the treatment of verruga nodules in man.

D. Harvey.

ALDANA (Luis). *Bacteriología de la enfermedad de Carrión.* [**Bacteriology of Carrion's Disease.**]—*Cronica Méd.* Lima. 1929. Aug. Vol. 46. No. 794. pp. 235–285. With 11 plates (9 coloured). [3 pages of refs.]

This issue of *La Cronica Medica* is designated a "monographic number," and is given up entirely to Dr. Aldana's thesis. He controverts many points now embodied as authoritative in the textbooks, and his views will doubtless be tested by other observers with the probable result of giving a firmer foundation to our knowledge of the disease. The author's conclusions, epitomizing his views and the results of his experimental work, are as follows :

1. The causal agent of verruga peruviana is a bacterium, *Bartonella bacilliformis*, a non-motile organism, growing in liquid and on solid media containing whole blood, plasma, or serum, and remaining alive, without any special precautions, for nine months.

2. Haemoculture succeeds in both the "anaemic" and the "eruptive" phases of the disease and for a long time after the verruga rash has disappeared; in other words, throughout the whole clinical course, and the bacillus maintains its morphological and cultural characteristics.

3. From the bacterial aspect the "anaemic phase" may be divided into four stages: (a) invasion; (b) fastigium, during both of which there is intense blood-destruction; this is not due to haemolysis but to a toxin formed by the bacilli, the corpuscles being phagocytied by the reticulo-endothelial cells of the vessels and organs; (c) decline which marks the end of blood-destruction; and (d) regeneration of blood.

4. The bacillus multiplies in kidneys, lymphatic glands, liver, spleen, bone-marrow and skin, and in this order of intensity. During the eruption they are to be found in the verruga nodules.

5. The bacillus is not intracorporeal, as is generally believed; it merely adheres to the exterior; those apparently within the red cells are thought to be so from bursting of the endothelial cells when smears are made.

6. Experimentally, inoculation of the bacilli results only in producing the eruptive stages, not the anaemia or Oroya fever stage. Inoculation was tried in dogs, monkeys, rabbits, guineapigs and fowls, by all routes, subcutaneous, intravenous, intraperitoneal, intratesticular and subconjunctival.

The coloured plates of the organisms in the blood and tissue endothelial cells are well reproduced; the photographs of the experimental lesions in animals are less successful.

H. Harold Scott.

MISCELLANEOUS.

KLEINE (F. K.) & KROÓ (H.). Antitoxine im Blut von Eingeborenen in Ostafrika. [**Antitoxin in the Blood of Native-Born East Africans.**].—*Deut. Med. Woch.* 1930. Jan. 10. Vol. 56. No. 2. p. 46. [Robert Koch Inst., Berlin.] [Summary appears also in *Bulletin of Hygiene.*]

The authors have tested 101 East African natives by the Schick reaction; 95 of these were children between the ages of 6 and 15, 6 were adults. In no case was a positive reaction obtained. The toxin employed was subsequently tested and found to have lost none of its activity. Specimens of blood were obtained from 11 of these natives and tested for antitoxin. Two sera contained more than one unit per cc., one serum contained one unit, two 0.5 unit, two 0.1, and three 0.05. It is clear, therefore, that the negative reactions were not due to any absence of reactivity in the skin of the natives, nor to any difficulty in reading the reaction, but resulted from the presence of circulating antitoxin. We have, apparently, another example of antitoxic immunity among a population which is not, so far as is known, exposed to infection with diphtheria. The same specimens of sera were tested for scarlatinal antitoxin by the Schultz-Charlton reaction. They gave a well-marked blanching. Such findings as these, as the authors point out, raise problems of the greatest importance for epidemiology and immunity; and it is clearly desirable that intensive studies should be carried out among different native races. [Such studies should include a very careful search for the diphtheria bacillus, or for toxigenic strains of haemolytic streptococci, among any populations found to possess the corresponding antitoxins.]

W. W. C. Topley.

D'HERELLE (F.). **Bacteriophagy and Bacteriophage.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 278-283.

—, MALONE (R. H.) & LAHIRY (M. N.). **The Pathology and Epidemiology of Infectious Diseases of the Intestinal Tract and of Cholera in Particular. I.**—*Ibid.* pp. 284-287.

—, — & —. **The Treatment and Prophylaxis of Infectious Diseases of the Intestinal Tract and of Cholera in Particular. II.**—*Ibid.* pp. 288-293.

MORISON (J.) & MARTIN (C. de C.). **The Therapeutic Use of Bacteriophage in Dysentery in Rangoon.**—*Ibid.* pp. 294-300. [Pasteur Inst. of Burma, Rangoon.]

In these four papers the whole subject of bacteriophagy, the nature of the bacteriophage, the bearing of bacteriophagy upon immunity to intestinal disease, the epidemiological significance of the bacteriophage and treatment by bacteriophage are touched upon in an extremely interesting way. The first paper is, very appropriately, a closely reasoned argument by d'Herelle himself on the nature of the bacteriophage principle. The subject is very intimately bound up with that of the nature of ultraviruses, with that of bacterial mutation, bacterial symbiosis and indeed with that of the nature of life itself as

defined by its manifestations. D'Herelle strongly maintains, and with a wealth of powerful arguments, that the bacteriophage is a living organism. It exists in the liquids which contain it in a granular phase and the size of its particles is equal to that of a micella of serum globulin, with diameter calculated at 20 to 35 millimicrons. Reproduction takes place only in the presence of and at the expense of living bacteria, and this fact allows of only two possible hypotheses as regards its nature, either that it is an enzyme derived from the bacterium or that it is a living autonomous being which utilizes bacterial substance in order to reproduce. A continuing symbiosis, moreover, can take place between bacteriophage and bacteria which have acquired resistance. Such a symbiosis can take place between other organisms and the host to which they have originally been pathogenic, as, for example, between bovines of tropical regions and the deadly *Piroplasma bigeminum*.

The author concludes: "Autonomy, the power of assimilation and of adaptation together constitute the criterion of life; all beings which possess these characters, and the bacteriophage is one of them, are undoubtedly living. The bacteriophage, a living being, is therefore an ultra-virus parasitic on bacteria and provokes in them an extremely contagious infectious disease manifesting itself to us through the phenomenon of bacteriophagy."

In the next two papers d'Herelle and his co-workers set out some of the data which bear upon the pathology, epidemiology, treatment and prophylaxis of infectious diseases of the intestinal tract, more particularly of cholera, considered from the point of view of bacteriophagy.

When a cholera epidemic is in full swing villages may be divided into (1) those where no case of cholera previously existed, but in which non-agglutinable vibrios and bacteriophages virulent for agglutinable cholera vibrios can be isolated from the bodies of flies and from the village drinking water, villages which appear to be "immune" in an epidemic; (2) those in which it has not been possible to isolate bacteriophage virulent for cholera vibrios either from the bodies of flies or from well water. At the time of the occurrence of the first case in a village it is not possible to isolate bacteriophage, but after a number of days it becomes possible to do so, and with this the epidemic is finally brought to an end because "contamination" by bacteriophage has become generalized. The original absence of bacteriophage and its appearance on the scene may be regarded as a repetition in the village community of what occurs in the individual who is attacked in the course of an epidemic.

Recovery in infectious intestinal diseases is not a question of the acquirement of immunity, but of exaltation of the virulence of a bacteriophage in the intestine of the patient, whereby the destruction of the pathogenic germ is brought about. The symptoms of acute dysentery in a patient treated with 2 cc. of a culture of bacteriophage disappear in 6 to 24 hours. Cholera, which is essentially an acute disease, has been treated similarly with 3 successive doses of 2 cc. of bacteriophage and the dosage repeated if necessary on the following day. As controls the authors took the cases present in a village on the day of visit for purposes of treatment not accepting bacteriophage treatment, as well as the cases which had occurred on the day before treatment and the cases which occurred on the day after. There was a mortality of 60 per cent. among 240 controls and only 8½ per cent. among 70 treated cases. Cessation of cholera epidemics takes place

with diffusion of bacteriophage virulent for cholera from the stools of patients containing it. The benefit of the bacteriophage thus produced is broadcast through the agency chiefly of drinking water and flies. It would be quicker to supply ready-made bacteriophage and to add it either before or during an epidemic to the drinking water of the community. But it is very essential in estimating the results of a given procedure to obtain some idea of its *absolute* as well as its relative efficacy. If, for example, all the procedures adopted were in reality ineffective it would not be sufficient to compare them relatively with one another. "In the course of all the epidemics in India the existence of cholera in a greater or smaller number of villages is only known when the last case occurs and it does not seem that the morbidity, the mortality and the duration of the epidemic is sensibly different in those villages from what they are in villages where the usual prophylactic measures are applied. In all cases are not the progress and the cessation of the epidemic entirely governed by natural agents?" It is the express desire of the authors to see experiments carried out on a large scale to determine the relative and absolute value of prophylaxis in cholera by means of bacteriophage. One point stands out prominently as necessary in such experimentation, namely, that only highly virulent bacteriophage be used in treatment or in prophylaxis.

The fourth paper by Morison and Martin deals not with cholera, but with dysentery.

They conclude that (1) "Under the conditions of a controlled test, not in all respects satisfactory, treatment of bacillary dysentery by bacteriophage alone has been as effective as orthodox treatment given to control cases . . ." and that (2) "the course of and the mortality from dysentery among cases treated with bacteriophage are not worse than in cases receiving antidysenteric serum, salines or other treatment appropriate to the cases." If, however, the cases diagnosed as bacillary dysentery are taken as a class apart, then (3) "the results of treatment with bacteriophage appear to be definitely better than those with other treatments."

W. F. Harvey.

MORISON (J.) & VARDON (A. C.). **A Cholera and Dysentery Bacteriophage.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 48-54. [3 refs.]

The medium of culture for bacteriophage is prepared as follows :

(1) Grind up together minced goat flesh 600 gm. and dried papain 75 gm. and add water slowly to make 3,600 cc. ; (2) heat in a water bath with rise of 10° C. every hour till 80° C. is reached ; (3) heat for 1 hr. at 80° C. ; (4) raise to boiling point and add N-1 sod. hydroxide to give reaction pH 7.8 ; (5) allow to cool ; (6) filter through thick cloth and filter paper ; (7) autoclave 45 min. at 15 lb. pressure ; (8) dilute this stock bouillon with 2 parts water.

The actual therapeutic bacteriophage, which was a combination of cholera and dysentery bacteriophages and included one which was active against both cholera and dysentery, was prepared by adding the whole washings of 18-hr. agar cultures of various strains of dysentery and of cholera to flasks containing 900 cc. of papain broth. Three loopfuls of the seed bacteriophage were added to each of the seven flasks used. After 6 hours' incubation at 37° C. lysis must be complete : the flasks are removed, shaken, left at room temperature overnight, mixed and filtered through Chamberland F candles under a vacuum

not exceeding 6 lb. Incubation tests for purity are applied both before and after distribution in ampoules, and the test of activity for the combined bacteriophage is that it must produce complete lysis in dilution of 1 in 10 million. Bacteriophage treatment has been applied in two epidemics of cholera and the combined statistics show 22 deaths out of 29 cases receiving no treatment and only 9 deaths out of 31 cases (including 4 moribund) receiving treatment.

W. F. Harvey.

SCHULTZ (E. W.). **The Bacteriophage as a Therapeutic Agent.**—*California & Western Med.* 1929. July. Vol. 31. No. 1. pp. 5-10. [55 refs.]

The author is a strong advocate for the therapeutic use of bacteriophages, but recognizes that certain factors may hinder or entirely prevent their curative effect. If all pathogenic bacteria were as uniformly susceptible to phage action as dysentery bacilli, the supply of suitable medicament would be a simple matter. But most pathogenic bacteria show strains with very varying susceptibility. Even a susceptible bacterium, if subjected to the action of a weak phage, may acquire resistant properties. This result is exemplified both *in vitro* and *in vivo*. Secondary resistant colonies appear in cultures which have undergone lysis, if the phage has been of insufficient virulence to sterilize completely. A balance between organism and phage may be established and the two come to coexist. The problem of therapy then, and it is not an easy one, is to find a phage of special virulence for the causal organism of a disease. Not only may different strains of specific organisms show very varying susceptibility to phage, but antibodies may be developed to the phage itself, which go to neutralize its solvent action. This may be seen especially in chronic urinary affections. Elimination of phage may play a part in failure of its action. For, while phage increases in concentration in the presence of bacteria, it is eliminated and will disappear if there are no organisms within its reach. Bacteriophage is only produced in the presence of organisms. The mode of administration of phage varies somewhat. In dysentery it is given by the mouth; in typhoid fever a combination of oral and subcutaneous administration may be followed; in colon infections of the urinary tract it is injected into the bladder or pelvis of the kidney after alkalinization of the urine, and subcutaneous injections are given in addition; in staphylococcus infections subcutaneous injection in the neighbourhood of the lesion is commonly used; wounds may be dressed with bacteriophage in addition to subcutaneous injection. The author finishes with the cautionary remarks that it may never be possible to justify commercial production of phage and that its usefulness at best may be restricted.

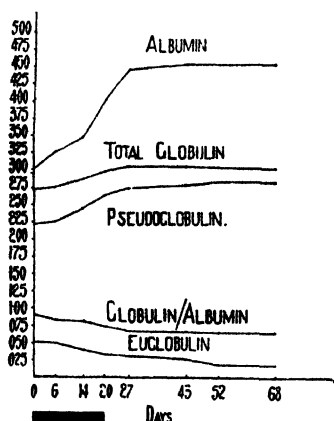
W. F. Harvey.

LLOYD (R. B.) & PAUL (S. N.). **Serum Protein Changes in Malaria and Typhoid Fever with Suggestions as to their Possible Bearing on Immunity.**—*Indian J. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 583-610. With 14 graphs. [17 refs.]

Previous work by the authors on the changes which occur in the serum protein fractions of kala azar patients when treated by antimony compounds [see this *Bulletin*, Vol. 26, pp. 319 and 744] has led to their

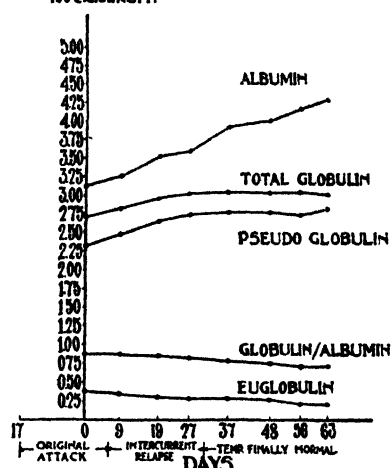
investigation of the changes occurring with an attack of malaria and the effect of quinine. The changes which occur in true typhoid fever and after inoculation with T.A.B. vaccine have likewise been investigated. A number of graphs are given of malaria and typhoid cases, showing, for days of illness and treatment, the albumin, total globulin, pseudoglobulin and euglobulin in gm. per 100 cc. serum, together with the globulin-albumin ratio. Only a few of the graphs

GRAMMES PER
100 C.C. SERUM



GRAPH F.

GRAMMES PER
100 C.C. SERUM.



GRAPH N.

Graph F relates to a patient with a long malarial history, whose blood, despite a prior 7 days' quinine course, contained malignant tertian rings on admission to hospital. After the first protein estimations had been made the patient was put on a 20 days' course of quinine.

Graph N relates to a typhoid fever patient whose illness had begun 17 days before the first protein estimations were made. On the 6th day of the graph the patient's temperature tended to become nearly normal, but subsequently rose and remained elevated up to the 31st day of the graph, providing a good example of the so-called "intercurrent relapse." It will be noted that the rise in the albumin began at about the same time as, and was not affected by, this intercurrent relapse, nor did the latter prevent the progressive fall of the euglobulin to normal.

[Reproduced from *Indian Journal of Medical Research.*]

prepared are illustrated here, and the remarkable fact is noted that there was no departure, even in a single case, from the typical features. In a typical case of malaria, before quinine administration has begun, it is found that there is a low total of serum protein, due almost entirely to reduction in the albumin. There may be reduction in the total globulin, but it is often slight and may be absent. The euglobulin is always raised, usually to about double the normal figure, and the pseudoglobulin is correspondingly reduced; but the sum of these two figures is not a constant. In no case did the globulin-albumin ratio exceed unity. With the initiation of quinine treatment (20 grains of sulphate in solution daily) the return of the protein fractions to normal is very rapid, and this is particularly well shown by the steepness of the gradient in the albumin curve. A very similar set of changes is observed in the case of typhoid fever, and graphs are given exhibiting

these changes throughout the whole of an attack in uninoculated persons, including relapses if they occurred. In typhoid fever, in marked contrast to malaria, the rise of the albumin to normality is gradual, not sudden. The authors think that this may be due to the fact that no specific drug exists for the treatment of typhoid. Inoculation of human beings with T.A.B. vaccine also gives rise to the characteristic changes in the serum, with the one difference of a raised total globulin figure: the changes are of less degree. It is rather extraordinary, and somewhat of an enigma, to find that in cases of typhoid associated with relapse the return of serum protein to normal amounts and relations is not affected: the return commences with the first defervescence, but does not reach actual normality until long after the temperature curve has touched normal.

The authors consider that, although malaria and typhoid fever are very unlike each other, these protein graphs suggest that it is the use of the specific drug in malaria which gives rise to serum protein response similar to that which a slow and gradual immunization produces in typhoid. They adduce evidence for the hypothesis that "in typhoid fever the period of low albumin and raised euglobulin represents the stage of immunization and that, only after immunization is complete, does the return to protein normality commence."

W. F. Harvey.

BANNERJEE (K.). The Streptococci and their Importance in the Treatment of Tropical Diseases.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 457-464. [1 ref.]

The rôle of the streptococci as primary disease agents and as causes of secondary infections is coming to be more and more recognized. In the tropics affections such as rheumatic fever, scarlet fever and purpura, which are generally regarded as of primary streptococcal causation, are rare. This may be related to the fact that the normal oral and nasopharyngeal flora in the tropics differs markedly from that of temperate regions. On the other hand, the incidence of empyema and puerperal septicaemia due to streptococci in Indian hospitals is very nearly the same as in temperate climates. An investigation has been carried out by the author into streptococcal manifestations affecting (1) the skin; (2) subcutaneous tissues; (3) the gastro-intestinal tract; and (4) the urinary tract. As primary cutaneous lesions, two varieties of impetigo have been met with, the superficial and the deep. Streptococci play a very important part as secondary infection of tinea and seborrhoeic dermatitis and make up nearly 60 per cent. of all skin diseases treated at the outdoor clinic. Most of the clinical manifestations of filariasis are in reality those due to streptococcal infection. As regards the gastro-intestinal tract, reference is made to the connexion between pyorrhoea alveolaris and multiple rheumatoid arthritis, while neuritic and joint pains may be due to infection of the larger nerve trunks and to septic emboli respectively, originating in a streptococcal subacute follicular tonsilitis. Gastric or duodenal ulcers and dysenteric ulcers, again, may be portals of entry of streptococci, with production of grave anaemia or of septic emboli in nerve trunks and joints. The intractability of amoebic ulcers may be due to secondary streptococcal infection. Evidence that many of the severe anaemias of unknown origin may be due to haemolytic strepto-

coccal infection is given by isolation of the organisms in the urine and the disappearance of symptoms under autovaccinotherapy. Some special animal experiments were done by perfusion of the kidney and showed that normal glomerular epithelium is impermeable to bacteria.

W. F. Harvey.

MORIN (Henry G. S.). Sur quelques cas de septicémie à entérocoque de Thiercelin. [*Enterococcus Septicaemia.*]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 690–704. [78 refs.] [Pasteur Inst., Saigon.]

At Marseilles 100 positive haemocultures afforded 7 enterococci. At the Pasteur Institute, Saigon, 24 enterococcus isolations are recorded out of 486 positive haemocultures. With an organism so ubiquitous as the enterococcus, proofs have to be adduced confirming the first isolation; such a proof would be constancy of finding of the organism in successive blood cultures. In France cases in which isolation of the organism has been successful have usually been moribund on arrival, while in Cochin China they are chiefly slight cases of gastric trouble. Neither type of case allows of opportunity for a second blood culture. Six cases, however, have afforded this proof, that is of the isolation of enterococcus on at least two successive occasions at an interval of not less than 24 hours. The clinical conditions were those of septicæmia with 5 deaths; 4 cases had signs of malignant endocarditis. On one case, occurring in Cochin China, of long duration, with endocarditis, numerous haemocultures were performed over a period of 3 months. On 10 occasions culture was positive, 9 with enterococcus alone and once in association with *Bact. coli*. The organism was identified as the enterococcus of THIERCELIN (*Streptococcus faecalis*, or *Micrococcus ovalis*) by morphological and cultural characters, insolubility in bile, growth in bile media, carbohydrate reactions, non-reduction of lead subacetate, clotting of milk, thermoresistance, and low pathogenicity for laboratory animals. The types of affection associated with positive blood culture of enterococcus are (1) simple gastric indisposition with ephemeral appearance of the coccus in the blood and appearance in the urine; (2) chronic malignant endocarditis with frequent appearance of the organism in the blood; (3) blood infection with cachexia. There is nothing to distinguish the organisms isolated from the faecal cocci constantly present in the intestine.

W. F. Harvey.

- i. GIGLIOLI (George). **Paratyphoid C. in British Guiana. Clinical and Epidemiological Notes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 235–256. With 5 charts & 1 diagram.
 - ii. —. **Paratyphoid C an Endemic Disease of British Guiana; a Clinical and Pathological Outline. *B. paratyphosum* C as a Pyogenic Organism; Case Reports.**—*Proc. Roy. Soc. Med.* 1929. Dec. Vol. 23. No. 2. pp. 165–177 (Sect. of Trop. Diseases & Parasit. pp. 1–13). With 4 charts & 2 figs. in text.
- i. This article deals in a very comprehensive manner with the clinical and epidemiological manifestations of the disease produced

in man by *Bact. paratyphosum C*. The clinical study is based on 92 cases and these were cases in which the diagnosis received laboratory confirmation.

"Paratyphoid C is eminently a 'fever' and its temperature curve constitutes its most characteristic symptom." This curve, which is a daily remittent one, shows a very variable duration of from 5 to 40 days. Unlike the enteric and the other parenteric fevers, the intestinal tract is not specially involved. Complications occurred in the shape of arthritis, abscess and cholecystitis. The abscess cases are especially interesting. Only one was a spontaneous case. The rest occurred in the gluteal region at the site of intramuscular injections of quinine bihydrochloride. Pure cultures of *Bact. paratyphosum C* were obtained from these abscesses. Fifty-nine of the paratyphoid C cases, simple or complicated with malaria, received quinine by intramuscular injection. Other complications were of the nature of concomitant or secondary morbid conditions, such as malaria, boils, helminthic affections, etc. The prognosis of the disease is dependent upon the form it takes. Mortality in the 92 cases of confirmed paratyphoid C reached 38 per cent., but obviously this is a mortality rate applicable only to hospital cases. The great mass of abortive and mild cases pass unobserved. Race, age, and sex distributions of the disease in the series investigated were "in fair proportion to the various elements of the local population." Fifty-seven cases were in negroes. As regards mode of spread, milk and food generally are excluded; flies are not considered important, and carriers are thought to be the most likely means of distribution of the infection.

ii. All the strains of the organism isolated in British Guiana conformed exactly in character to what has been described as the eastern subtype of the *supestifer-paratyphosum* group. The explanation of the presence of what is apparently a strictly eastern organism is tentatively ascribed to the large importation into British Guiana of coolies from India and China. A marked relation of the disease induced by *Bact. paratyphosum C* to malaria is emphasized, and the association amounted in the series of cases reviewed to 29 per cent. The purely septicaemic character of the disease is shown at autopsy, and in uncomplicated cases the bowel has appeared to be quite normal. Accidental occurrence of deep intramuscular suppuration at the site of intramuscular injections afforded a clue for the adoption of a mode of cutting short the septicaemia infection by formation of a fixation abscess. Quinine injections were used as the means of provoking such abscesses. In their evolution they were accompanied by little or no pain and were afebrile in 75 per cent. of the cases observed. They afforded pure cultures of *Bact. paratyphosum C*. The pus was not confined in a cavity, but distended the intermuscular spaces, to form large pockets. It was watery and of a dirty yellow green colour. No difficulty was found in dealing with the abscesses in spite of their infiltrating character, and they healed completely in 2 to 3 weeks. With the development of abscess there was invariably a marked improvement in the general condition of the patient. Thus *Bact. paratyphosum C* must be regarded as a pyogenic organism; its pyogenic activity is manifested usually in tissues whose resistance has been diminished by trauma or pre-existing disease, that is to say, in a *locus minoris resistentiae*.

W. F. Harvey.

ROMITI (C.). **Notes on an Unusual Case of Suppurative Cholecystitis from *Bacillus paratyphosus* C. Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 257-262.

The case was one which showed on admission a heavy malarial infection and received quinine by the mouth and intramuscularly. As the fever was not influenced by the treatment, blood cultures were taken and *Bact. paratyphosum* C isolated. Temperature fell to normal on the 24th day. On the 34th day an abscess developed in the buttock region and *Bact. paratyphosum* C was grown in pure culture from the pus. Complications in this case were a *Staphylococcus aureus* abscess on the 16th day in the parotid region and the development of symptoms pointing to gall bladder infection from the 15th day. After the development of further symptoms, a diagnosis of suppurative cholecystitis was confirmed at operation and pure cultures of *Bact. paratyphosum* C were obtained from the pus. No gall stones were present and the post-operative course was excellent. The features of the case were: (1) the causation by *Bact. paratyphosum* C; (2) the afebrile course and extreme mildness of all subjective and objective symptoms in spite of suppurative pericholecystitis; (3) the spontaneous elimination of a necrotic gall bladder; and (4) the absence of gall stones.

W. F. Harvey.

MESNARD (J.), JOYEUX (B.) & GAULENE. Un cas de mélioiidose au Tonkin. [**A Case of Melioidosis in Tonkin.**]—*Bull. Soc. Méd. Chirurg. Indochine.* 1929. Jan. Vol. 7. No. 1. pp. 32-39. With 1 chart. [2 refs.] [Pasteur Inst. & Lanessan Hosp., Hanoi.]

Reports of the occurrence of melioidosis in human beings are still infrequent. The case referred to is only the third which is known to have occurred in a European and his infection was probably contracted in the usual way by ingestion of food contaminated with the dejecta of rats. In its onset the disease was sudden, with rigor, fever and lumbago. From the beginning the patient showed dulness of mind, although he could reply quite clearly to questions addressed to him. By the 4th day improvement set in, which continued for a time; a papular rash was observed on the abdomen on this day. A return of symptoms, however, occurred; pneumonia and coma supervened and the patient died on the 13th day. No malaria parasites were found in the blood and serum agglutination was negative for the typhoid group of bacilli. It was otherwise for *Proteus* X19. Although the agglutination was negative for the indole-positive *Proteus* X19, it was positive in a titre of 1 in 300 for the indole-negative *Proteus* X19 (with blood drawn on the 6th day of the disease). The suggestion raised by this result that the affection might be typhus was negatived by the injection of the patient's blood into two guineapigs; no rise of temperature occurred. Blood culture, on the other hand, in peptone bouillon was positive after 2 days' incubation at 37°C., and the organism grown was identified morphologically, culturally and serologically as *Pf. whitmori*. The diagnosis of melioidosis appears to be perfectly justified in spite of the occurrence of a Weil-Felix reaction.

W. F. Harvey.

SCHWENTKER (Francis F.). **The Estimation of Hemoglobin. A New Hemoglobinometer.**—*Jl. Lab. & Clin. Med.* 1929. Dec. Vol. 15. No. 3. pp. 247-259. With 3 text figs. [2 pages of refs.] [Lab. of Physiol. Chem., Johns Hopkins Univ., Baltimore.]

It is probable that no clinical blood examination is quite so universally employed as the estimation of haemoglobin. The present article is

particularly interesting, not merely for the method advocated, but also for the review presented of existing methods.

1. *Direct Colour Comparison Method.* The names of GOWERS (1878), v. FLEISCHL, DUBOSC, TALLQUIST and DARE are among those associated with this method. "The Tallquist is probably the least reliable of the series . . ." and, "the Dare instrument has many times been shown to have an accuracy little greater than the Talquist. In fact, the general error of the instruments constructed on this principle has been shown . . . to range from 10 per cent. to 40 per cent."

2. *Acid Haematin Method.* The method, introduced by SAHLI (1895), consisted in the conversion of the haemoglobin of the blood to acid haematin and a comparison of the colour so obtained with a standard. But the colour of standard solutions fades rapidly and may even reach 50 per cent. in 18 months. Other standards of colour than the actual acid haematin have been employed. Some of these also fade, some are difficult to match, and some are susceptible to variations in temperature. One great disadvantage of the method is the delay in the formation of the maximum colour of the acid haematin, and a period of 40 minutes must elapse before reading, if even an intrinsic accuracy of 1 per cent. is to be obtained. Differences of 1 mm. in the tubes used for comparison may result in errors of 25 to 33 per cent. A certain amount of reduction of the time to formation of maximum colour may be obtained by the application of heat, but cloudiness is produced by temperatures over 30° C. Careful estimations, however, against standards checked within a month may give results with errors not exceeding 5 to 7 per cent.

3. *The Carbon Monoxide Method.* The method proved too complicated for use until HALDANE (1900) adapted it for use with the Gowers colorimeter. The carbon monoxide is furnished from ordinary coal gas. Results accurate to 5 per cent. may with care be obtained if the standards are fresh.

4. *Iron Content Method.* With this method a rather high accuracy (1 per cent.) is obtainable, but it requires too much time and too much blood to be adopted in routine work.

5. *Oxygen Capacity Method.* Both experience and time are required to carry out the test, but in the newest instrument made (VAN SLYKE and MALL) results with maximum variation of 0.48 per cent. have been recorded.

6. *Specific Gravity Method.* The assumption on which this method was based, was that the haemoglobin content and the specific gravity of blood have a definite relation, but this has been proved to be incorrect.

7. *Spectroscopic Method.* The various methods depend on the comparison of the spectrum of diluted blood with a known haemoglobin solution. Instruments used in the estimation are usually large and expensive.

8. *Spectrophotometric, Refractometric and Extinctometer Methods.* These are not ordinarily used for clinical purposes.

The author's own method utilizes the principle that "if blood be diluted to a known volume and the depth of the fluid stratum varied until the spectrum caused by it assumes some predetermined picture, the concentration of the oxyhemoglobin in the solution will be inversely proportional to the known depth. Or,

$$c = A \frac{D}{d},$$

where c = the concentration of oxyhemoglobin in the blood (gm. per 100cc.) A = the absorption constant (determined experimentally), D = the dilution (cc.), d = the depth of the fluid stratum (cm.)." The constant A must obviously be first determined. Only a small quantity of blood (0.1 cc. and even 0.025 cc.), such as may easily be obtained from a prick of the finger, is required. It is claimed that even with bloods of low haemoglobin concentration the readings check within 0.7 per cent. A criticism might be

advanced that the method requires for its use the certainty that the test blood shall be totally saturated with oxygen. It has been found, however, that "enough oxygen is absorbed by the blood during its exposure on the finger tip and from the water with which it is diluted to cause no appreciable error in the results."

W. F. Harvey.

VAN WALSEM (G. C.). Over de reiniging van glaswerk, gebruikt bij het morphologisch bloedonderzoek, en over de vulling der telkamers met nauwkeurig bepaalde hoeveelheden. [**Cleaning of the Glass-ware used in Blood Examination and Filling of the Counting Chamber with Accurate Fixed Quantities.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. July 13. Year 73. 2nd Half. No. 28. pp. 3258-3260. With 5 figs. (1 on plate).

The technique of the blood count is a highly important one because it is so widely used. The cleansing fluid for pipettes and chamber has the composition, 10 per cent. sod. hydroxide 2 cc. with 2 drops of bromine. Traces of blood develop gas (nitrogen) in contact with this fluid, whereby cleansing is facilitated. The glass pipettes should be filled with fluid and left for 10 minutes. They are washed through with water, alcohol and ether in the usual way. Stress is laid on the use of a definite quantity of blood-reagent mixture in the counting chamber and it is obtained as follows: (1) Two drops are rejected from the filled pipette; (2) 2 more drops are then placed in a watch glass; (3) an air bubble, occupying one subdivision, is sucked up into the pipette; (4) 4 subdivisions of mixture from the watch glass are taken up into the stem of the pipette. The operation has to be quickly performed to avoid sinking of corpuscles. These 4 subdivisions of blood mixture are put out upon the central plate and, in the instrument used, occupied the entire plate and a portion of the trough around it. Corpuscles are not absolutely uniformly distributed over the whole central plate surface, for there is a narrow rim at the periphery which has fewer corpuscles per unit of area than the centre, but the error is constant and negligible. It is not remedied, but rather aggravated, by taking an amount of mixture less than the exact 4 subdivisions of the pipette. With this technique erythrocytes, leucocytes and blood platelets stand out distinct from one another and can be counted.

W. F. Harvey.

CHOPRA (R. N.) & GHOSH (Sudhamoy). **Observations on Certain Medicinal Plants used in the Indigenous Medicine.**—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 377-384. [2 refs.] [School of Trop. Med. & Hyg., Calcutta.]

The following plants, well known in Indian medicine, were examined: *Tribulus terrestris* Linn. (N.O. Zygophyllaceae). An extract prepared from the seeds was tried clinically and was found to be diuretic, but to have no advantage over similar drugs of the British Pharmacopoeia. *Pistacia integerrima* (N.O. Anacardiaceae). The drug is prepared from galls on the surface of the leaves. This was found to be expectorant, but to be much overrated.

Caesalpinia bonducella Fleming (N.O. Leguminosae). As the chemical examination of the seeds did not reveal active principles with marked pharmacological action no clinical trials were made.

Abroma augusta Linn. (N.O. Sterculiaceae). In the absence of signs of physiological activity of the roots no clinical trials were made.

A. G. B.

CHOPRA (R. N.) & DE (Premankur). *Saussurea lappa* (Kut Root) in **Pharmacology and Therapeutics**.—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 351–359. With 2 plates. [7 refs.] [Calcutta School of Trop. Med. & Hyg., Calcutta.]

Saussurea lappa, a Compositaceous herb with annual stem and perennial roots, grows on the slopes of the Himalayas, and the root is so greatly esteemed in India that the market price in Calcutta is about seven shillings per pound. It is used for various symptoms, especially asthma. It is exported to China in large quantities to be used as incense, spice and medicine.

The root was found to contain an essential oil 1.5 per cent., an alkaloid, saussurine, 0.05 per cent., and resin 6.0 per cent. The drug in the form of an alcoholic extract of the root has a remarkable effect, exercised jointly by the essential oil and the alkaloid, in controlling attacks of bronchial asthma, especially those of the vagotonic type. It is useful also in persistent hic-cough, but has no action in malaria, leprosy or rheumatism, or against helminths.

A. G. B.

MINOT (A. S.) & CUTLER (J. T.). **Guanidine Retention and Calcium Reserve as Antagonistic Factors in Carbon Tetrachloride and Chloroform Poisoning**.—*Jl. Clin. Investigations*. 1928–29. Vol. 6. pp. 369–402. With 2 charts in text. [43 refs.] [Med. School, Vanderbilt Univ., Nashville.]

Minot in 1927 lost most of his carbon tetrachloride treated dogs owing, as he ascertained, to the calcium-deficient diet on which they were kept (lean meat without bones), and showed that after addition of calcium salts they were tolerant of the drug: cases of intoxication could be cured by calcium therapy (this *Bulletin*, Vol. 25, pp. 417, 469). Here further studies are described at length with the following conclusions:—

" 2. The outstanding features of the intoxication [of dogs on a calcium-low meat diet fed carbon tetrachloride] are gastro-intestinal irritation, nervous hyperexcitability usually followed by depression, bilirubinemia, a retention of guanidine in the blood and hypoglycemia. Pathological studies show a severe central necrosis of the liver.

" 3. A similar but more severe toxic picture is presented in chloroform poisoning or when alcohol is given with carbon tetrachloride.

" 4. A causal relationship between the retained guanidine in these intoxications and the symptoms noted is indicated by the fact that the maintenance of similar concentrations of guanidine in the blood of a normal dog by the administration of guanidine hydrochloride produces an intoxication in which there is close similarity to carbon tetrachloride poisoning both in the quality and severity of symptoms produced. Calcium also has a highly beneficial action in guanidine poisoning.

" 5. The basis for the relief and protection afforded by calcium in carbon tetrachloride poisoning seems to lie in its antagonistic effect to the retained guanidine . . .

"6. At least three factors contribute to the acute need for calcium in carbon tetrachloride poisoning, (a) the deficient calcium intake, (b) the need for extra calcium to combat the effects of guanidine, and (c) the reduction of ionized calcium in the blood by combination with retained bile pigments.

"7. Practical suggestions for the safe use of carbon tetrachloride would emphasize the importance of a liberal calcium diet and the avoidance of meat which tends to increase guanidine retention."

"A bread and milk diet is an easy method of furnishing both calcium and carbohydrate in adequate amounts. With these precautions cases of intoxication should be extremely rare. If poisoning should occur, a combination of calcium chloride and dextrose therapy seems indicated and in our experience has nearly always proved effective."

A. G. B.

BOYD (T. C.) & ROY (A. C.). **Observations on the Excretion of Antimony in the Urine.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 94–108. With 19 charts & 1 text fig. [5 refs.]

It appeared to the authors to be of practical importance to study the excretion of antimony, both pentavalent and trivalent, in kala azar. No. 693, a diethylamine salt of p-aminophenyl stibinic acid, was chosen as a type of a pentavalent antimony compound and sod. ant. tart. as a trivalent compound. Much of the paper is occupied with a description of the method employed for antimony estimation in the presence of organic matter. The following are among the conclusions reached:—

"(2) We have studied in detail the excretion rate of a pentavalent compound (i.e., No. 693), when given intravenously and found that on an average about 41 per cent. of the antimony is excreted in the first twenty-four hours, 6 per cent. in the second, and about 1 per cent. in the third twenty-four hours.

"(3) We have shown that when the same compound (No. 693) is given intramuscularly about 34 per cent. of the antimony is excreted in the first twenty-four hours, 3 per cent. in the second, and 1.5 per cent. in the third twenty-four hours.

"(4) The types of curves obtained under both intravenous and intramuscular injections are similar except that there is a slight lag in the excretory rate when the intramuscular route is used.

"(6) The excretion rate of a trivalent antimony compound (i.e., sodium antimony tartrate) is extremely low when compared with No. 693 and is characterized by a gradual fall."

The injections were given to two patients in each instance.

A. G. B.

SHATTUCK (George C.). **Further Use of Antimony Thioglycollamide in Bilharziasis and in Trypanosomiasis.**—*Jl. Trop. Med. & Hyg.* 1930. Feb. 1. Vol. 33. No. 3. pp. 33–34. [5 refs.] [Harvard School of Public Health, Boston.]

In 1926 the author published an account of 3 cases of granuloma inguinale treated with sodium antimony thioglycollate and triamide of antimony thioglycollic acid [see this *Bulletin*, Vol. 24, p. 315]. An account is here given of a few cases of schistosomiasis and trypanosomiasis treated by CHESTERMAN and TODD in Belgian Congo.

In the 14 cases of schistosomiasis, which are tabulated, prompt relief was given with doses that were small both individually and in total: adequate follow up was not possible, but some patients appeared to be well five months or more after the treatment. In the six cases of trypanosomiasis the results appear to have been less favourable. It is stated that CHESTERMAN is sceptical of the value of antimony thioglycollamide. [The paper seems to be incomplete, for the "summary" contains much that is not found elsewhere.]

A. G. B.

STOCKMAN (Ralph). **Lathyrism.**—*Jl. Pharm. & Experim. Therap.* 1929. Sept. Vol. 37. No. 1. pp. 43–53. [9 refs.] [Univ., Glasgow.]

Dr. Stockman's paper adds little to our knowledge of lathyrism. He describes the work of ACTON and of ACTON & CHOPRA (this *Bulletin*, Vol. 20, pp. 46 and 645) who found the active principle of this pea to be an amine which caused the characteristic symptoms in experimental animals. The work of ANDERSON, HOWARD & SIMONSEN (*l.c.*, Vol. 22, p. 985) is criticized; in their experiments *Lathyrus sativus* was harmless and they believed the symptoms to be due to contaminating seeds of a vetch (*acta*). Stockman points out that lathyrus poisoning has long been well known in man and animals in countries wide apart, in many of which it is cultivated without appreciable admixture of other seeds, so that the results of these workers cannot be the whole story. He has repeated some of his former experiments, feeding four monkeys on lathyrus peas bought in Glasgow and describes the symptoms produced in two of the animals. [In the absence of satisfactory evidence that the diet contained essential vitamins the value of the experiments seems doubtful.] Other feeding experiments were made on rabbits and guinea-pigs. The author finds that the poisonous active principle can be more or less fully extracted from the ground peas by cold water, acidified water, weak and 90 per cent. alcohol and by chloroform and when highly purified proves to be very toxic when tested on monkeys and frogs.

A. G. B.

COWAN (J. M.). **Cinchona in the Empire. Progress and Prospects of its Cultivation.**—*Empire Forestry Jl.* 1929. Vol. 8. No. 1. pp. 45–53. With 2 plates.

The author points out that within the Empire India is the only country where cinchona is cultivated on a large scale. After its introduction, between 1854 and 1864, private planters took up the cultivation but by 1890 there was over-production, and cinchona gave place to tea, so that the cinchona plantations are now owned and managed by Government. However, the production is small relative to Java, 4 per cent. as against 90 per cent., and the quantity produced in India represents only about one-third of that actually consumed in the country; were India to be in a position to provide what is estimated as the minimum of her requirements, the production would have to be

multiplied 18 times. Not only are supplies insufficient, but the price is too high. Three species of cinchona are cultivated with the percentage of quinine and other alkaloids set forth :—

	Quinine.	Other alkaloids.	Total alkaloids.
<i>C. Ledgeriana</i> ...	5.49	3.03	8.52
<i>C. officinalis</i> ...	2.93	2.07	5.00
<i>C. succirubra</i> ...	1.40	4.85	6.25

It is seen that *C. ledgeriana* is richest in quinine and in total alkaloids, and *C. succirubra* in "other alkaloids." The author discusses the cultivation of cinchona and especially *ledgeriana*. All three are fastidious in their requirements. There are untried areas in India, Malaya and Tanganyika where conditions would seem to suit. Harvesting of the bark begins in a block in the fourth year, and the block is uprooted about the tenth year, when the bark is completely stripped from root, stem and branch. He thinks there is scope for investigation as to particular strains which yield high percentages of quinine. [Whether cinchona should be grown for its yield of quinine or of other alkaloids is not yet settled.]

A. G. B.

MEGAW (J. W. D.) & HAWLEY (Herbert). **Simple Tests for Stock Solutions of Quinine and Potassium Iodide.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 378–380. With 3 text figs.

Reference is made to an earlier paper by the senior author and others [this *Bulletin*, Vol. 26, p. 23]. Recently, many samples of stock mixtures of quinine have been tested in the Punjab and Madras. Thus, at the Headquarters Dispensary, Madras Presidency, solutions of stated strength 10 grains were found actually to contain 1.6, 3.1, 7.2, 7.2, 5.4 and 3.9 grains. In 5 other dispensaries the strength of the same stock solution varied between nil and 6.8 grains (excepting one instance in which it was 12.2). "Many of the medical officers were astounded at the results of the tests." They throw a flood of light on the supposed failure of quinine when given by the mouth and "it is safe to say that cases of quinine-resistant malaria are usually cases of compounder-resistant malaria." Details of the test are given and sketches of the apparatus. As a rule, the defect does not lie in the powder, but in the preparation of the mixture. The Pot. Iod. solutions were usually up to strength.

A. G. B.

WATS (R. C.). **A Simple Method for Estimation of Quinine Salts in Stock Solutions.**—*Jl. Roy. Army Med. Corps.* 1929. Dec. Vol. 53. No. 6. pp. 445–447. [2 refs.]

The author refers to MEGAW's papers on the quinine content of mixtures used in civil hospitals in India [see above]. He recommends a method of estimation of quinine salts which "can be carried out . . . just as easily as a milk-fat estimation." For details the journal must be consulted.

A. G. B.

VIALATTE (E. F. C.) & REMONTET (J. E.). Un cas de purpura provoqué par la quinine. [**Case of Purpura provoked by Quinine.**]*—Arch. Méd. et Pharm. Milit.* 1929. Oct. Vol. 91. No. 3. pp. 345-349. [1 ref.]

In spite of a considerable experience of North Africa, where the troops take quinine for half the year, the authors have met with only one case of quinine purpura :—

A soldier, taking daily .4 gm. of quinine, was admitted for purpura on June 12th. On June 7th he noticed an eruption on his arms, generalized the next day with bleeding from the nose and gums, and accompanied by muscular pains and lassitude. On the 12th there were scattered purpuric patches on the skin and on the tongue and buccal mucosa ; on the 14th a fresh crop with gum bleeding. Quinine was stopped and the signs disappeared. On July 3rd a gram of quinine was taken ; 2½ hours later the gums bled freely with slight fever. July 17th, another gm. of quinine ; 2 hours later gum bleeding lasting 24 hours with petechial patches on the skin and muscular pains. Quinine was then finally stopped and no further manifestations occurred.

The authors compare this condition with haemoglobinuria, equally rare in North Africa. In each the dose of quinine is immaterial. According to MARCHOUX for quinine haemoglobinuria to appear there must be visceral lesions which may be transitory ; *i.e.*, a small dose of quinine may produce haemoglobinuria in a subject in whom two days later a much larger dose will not. Similarly the subject of this paper had taken quinine with impunity the previous year. They note also that with the purpura were present arterial hypotension, asthenia, bronzing, blood urea above the normal, conditions reflecting a state of organic insufficiency which prepared the ground for the action of quinine. A few figures are given of the state of the blood and urine.

A. G. B.

BIGINELLI (P.) & SCORDIA (F.). Valutazione quantitativa della chinina e chinidina nei chineti e negli alcaloidi secondari della china. (**Quantitative Test of Quinine and Quinidine in Quinetums and Inferior Cinchona Alkaloids.**)—*Riv. di Malarologia.* 1929. Sept.-Oct. Vol. 8. No. 5. pp. 534-537. [English summary p. 633.]

The four principal alkaloids found in cinchona bark are divisible into two pairs, quinine and quinidine and cinchonine and cinchonidine. The two members of the former pair contain one methoxyl group each and those of the latter pair no methoxyl group. A method for the estimation of methoxyl groups in organic chemical compounds has long been known depending on the conversion of the methoxyl group into methyl iodide by the action of hydriodic acid, the methyl iodide being distilled from the reaction mixture in a special apparatus, into an alcoholic solution of silver nitrate where it forms silver iodide, which is collected and weighed. The authors have applied this method to the determination of the amounts of quinine and quinidine in various cinchona alkaloid preparations. It is well known that the various cinchona alkaloids are not readily separable and it is therefore not surprising that by this method the authors found over 30 per cent. of quinine in each of three samples of cinchonidine tartrate and that three samples of " quinetum " supposed to contain 29·5, 37·5 and 20 per cent. of quinine were actually found to contain by this method 37·1,

44.3 and 32.4 of quinine and quinidine. It should be understood that the method estimates quinine and quinidine together and the results afford no indication of the relative amounts of these two alkaloids present.

T. A. Henry.

MANAI (Andrea). Ittero da plasmochina. [**Jaundice from Plasmochin.**]—*Polichinico*. Sez. Prat. 1929. Aug. 26. Vol. 36. No. 34. pp. 1215-1217. [1 ref.] [Inst of Path. & Clin. Med., Univ., Sassari.]

A girl of 17 years was given one tablet of 2 cgm. of plasmochin on March 5th, two on the 6th, three on the 7th. The following day there was a slight icteric tint, but three more tablets were given. The result was a marked jaundice which did not clear up for a week; no pruritus or bradycardia. A week later, to test whether this was due to the drug, three tablets were given on two successive days and the jaundice returned as before, the red corpuscles falling 20 per cent. The conclusion is drawn that plasmochin in the usual therapeutic doses can produce jaundice due to a toxic haemolysis.

H. Harold Scott.

DANZEL (Lucien). A propos de l'Hélianthe ou Grand Soleil plante industrielle et médicinale. [**The Sunflower in Industry and Medicine.**]—*Rev. Méd. et Hyg. Trop.* 1929. Sept.-Oct. Vol. 21. No. 5. pp. 158-163.

Sunflower was formerly employed in the treatment of malaria, and has been used by the author as a tincture in conjunction with quinine.

A. G. B.

- i. CHRISTOPHERS (S. R.). **The Mixture Reaction in Haemolysis by Acids and Bases.**—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 533-543. [4 refs.]
- ii. —. **Haemolysis by Acid and Base and by Acid and Basic Salts including Quinine and its Salts.**—*Ibid.* pp. 544-563. With 3 graphs. [7 refs.]
- iii. —. **The Electric Charge of the Red Blood Corpuscle, Haemoglobin and Stroma in Relation to Haemolysis.**—*Ibid.* pp. 564-573. With 4 graphs. [10 refs.]

i. The author suspended given quantities of washed red cell substance in 0.9 per cent. salt solution containing a known molecular concentration of acid (usually HCl) or base (NaOH). With either acid or base two distinct but related reactions may take place.

(1) A quick reaction, complete in 5 minutes, in which a proportion of the acid (or base) is taken up by the cells, and a proportion is left free giving a reduced H⁺ ion concentration to the supernatant fluid. This fixation of the acid (or base) may be an adsorption phenomenon, or may be due to the formation of a protein salt by the combination of NH₂ groups with HCl, or of COOH groups with NaOH.

(2) A slower reaction resulting in haemolysis of the protein complex. The interesting observation is made that, provided a sufficient initial concentration of acid or base is used, haemolysis takes place equally well and in about the same time whether the cells are left in the reaction mixture, or are removed from the mixture, washed, and resuspended in fresh neutral saline. Hence it appears that, contrary to the views of PONDER and McLACHLAN (*Brit. Jl. Experim. Path.*, 1929, Vol. 8, p. 382), "subsequent haemolysis is not an indication of any

pari passu reaction on the medium, but is an affair of the cells themselves," and is a function of the amount of acid or base taken up by the cells in the initial quick reaction. If this amount is large haemolysis follows rapidly; if small, haemolysis either takes place slowly or not at all.

ii. Oxalated human blood was centrifuged, the deposit washed in 0.9 per cent. saline, and a suspension of a known weight of these cells made in 0.9 per cent. saline containing a known concentration of the haemolytic agent. The mixture was incubated at 37° C. for three hours, with occasional shaking.

All quantitative haemolytic effects by acid and base, acid and basic salts and such substances as quinine and quinine salts are dependent on a critical "haemolytic dose" absorbed by the cells in a quick reaction completed in five minutes (see previous paper). This critical dose which will just haemolyse 1 gram. of red cell substance in 3 hours at 37° C. is, for HCl 0.00016, for lactic acid 0.0002, for acetic acid 0.00026, and for boric acid 0.2 molecular concentration. Under these conditions a critical residual pH results in the supernatant fluid, being 5.0 for acetic acid and 5.6 for HCl.

Quinine, as regards limit of haemolytic effect, behaves as a base and does not appear to show any specific alkaloidal effect as distinct from its effect as a base. Similarly quinine dihydrochloride gives results which are almost exactly similar to an equivalent solution of HCl: Quinine monohydrochloride, on the other hand, gives peculiar results which are probably due to special conditions prevailing in regard to dissociation. Quinine sulphate is not sufficiently soluble to give the necessary concentration of acid for haemolysis.

The cause of haemolysis by acids and bases appears to be that the cell adsorbs H or OH ions with the formation of dissociable compounds with the proteins of the cell. There is thus introduced a state of electric charge, imbibition of water and other correlated effects such as osmotic effects due to increased dissociation of the proteinate. These associated changes cause the haemoglobin, which is normally a gel at or near the isoelectric point, to become dispersed beyond the critical point at which the gel state can exist. This conclusion is sharply opposed to the general supposition that haemolysis occurs when the isoelectric point of the *stroma* is approached, resulting in flocculation of the stroma and consequent liberation of the haemoglobin.

iii. This paper records observations, of a preliminary character, upon the electric charge carried by the red cell, haemoglobin, and stroma under certain circumstances, with a view to explaining the behaviour of the red cell under haemolytic influences.

Suspensions of red cells (human) were made in isotonic glucose solution, and washed, by centrifuging, in six lots of fresh glucose solution in boiled redistilled water. [The author differentiates between glucose and dextrose (Merck) which he considers clearly distinct, 5.8 glucose being isotonic while 6.0 dextrose (Merck) was necessary. The abstractor suggests that these differences may be due to the glucose used being anhydrous glucose while dextrose (Merck) may be glucose monohydrate.] Macroscopic observations were made using the cataphoretic tube of NORTHROP (Studies from Rockefeller Inst., 1923, Vol. 44, p. 219), while for microscopic observations, which gave results similar to the macroscopic method, the cataphoresis cell of BROWN and BROOM was used (*Brit. Jl. Experim. Path.*, 1929, Vol. 10, p. 61). In the macroscopic method a 1 per cent. suspension of red

cell substance in isotonic glucose was used, while in the microscopic method a suspension of 1.1 gm. per litre was found preferable.

Red cells washed as described in isotonic glucose show a negative charge with a velocity rate of about 3μ per second per volt per cm. The effect on this charge of the addition of electrolytes, sodium chloride (monovalent kation) thorium nitrate (tetravalent kation), of acid (HCl), and of base (NaOH), are given in a series of graphs. Graphs are also given for the cells, haemoglobin, and stromata, so far as these can be completed, under different additions of HCl and NaOH respectively.

The results obtained, together with the facts recorded in the previous paper, lead the author to reject the view usually held that haemolysis is due to liberation of the haemoglobin as a result of flocculation of the stroma protein on reaching or approaching its isoelectric point. Hence the author adheres to the explanation of haemolysis given in the previous paper (*q.v.*) and concludes that the point of greatest safety for the cell is that at which the *haemoglobin* has a charge approximating to zero, and haemolysis tends to occur when a charge of either positive or negative character is imparted to this substance.

H. Raistrick.

MANAI (Andrea). Sistema reticolo endoteliale e infezione malarica (prima memoria). [**The Reticulo-Endothelial System in Malaria.**] —*Haematologica*. Pavia. 1929. Vol. 10. No. 5. pp. 407-420. With 2 coloured plates. [1 ref.] [French summary p. 420.] [Inst. of Path. & Clin. Med., Sassari.]

This paper deals with an old haematological problem in malaria, *viz.*, the origin of certain forms of large mononuclear cells met with in the blood in particularly grave cases. The author gives an account of six cases of severe malignant tertian in which the red cells oscillated round 3 millions and the leucocytes ranged from 17,000 to 23,000 with a monocyte percentage of 46-54 per cent. The differential leucocyte counts in the 6 cases may be of interest.

Case.	Neutrophils per cent.	Lymphocytes per cent.	Eosinophils per cent.	Monocytes per cent.	Total Leucocytes.
1	38	10.5	1.5	50	22,500
2	35	16	1	46	17,200
3	35	15	1	47	19,200
4	31	12	4	54	23,600
5	33	15	2	50	21,200
6	33	15	1	51	21,700

The percentages of *atypical* monocyte forms in the above were, 40, 35, 35, 45, 40, 40. Coloured illustrations of these cells are presented. Some are endothelioid, but the most numerous monocyte forms have the characters of the plasma cell. The author is of opinion that these forms are probably derived from histiocytes of splenic origin. Granted that the spleen is the most injured organ, it is probable that in these grave cases it allows to pass into the general circulation elements of the R.-E. system resembling monocytes. These would still possess morphological features permitting their differentiation from the ordinary blood monocytes.

J. C. G. Ledingham.

TSCHERIKOWER (R. S.) & RUBINSTEIN (P. L.). Ueber die Bedeutung des retikuloendothelialen Apparates bei Infektionskrankheiten. IV. Das retikuloendotheliale System bei infektiösem Ikterus. [**Significance of R.E. Apparatus in Infectious Diseases. IV. R.E. System in Infectious Jaundice.**]—*Zent. f. Bakt. I. Abt. Orig.* 1929. Sept. 28. Vol. 114. No. 1/2. pp. 65–68. [5 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

Twenty-five guineapigs were splenectomized and 24 hours later were infected with a rather weak strain of *Sp. icterogenes* (*L. icterohaemorrhagiae*). Twenty-one normal controls were also inoculated, the route of infection being intracardial. The results showed no significant difference between the two sets, 8 of the splenectomized and 5 of the controls succumbing to the infection. They infer that the protective action of the R.-E. system in this disease is unimportant or nil.

J. C. G. Ledingham.

KRITSCHESKI (I. L.) & RUBINSTEIN (P. L.). Ueber die Natur der Immunität bei Rückfallfieber. IX. Die Bedeutung des retikuloendothelialen Systems beim Rückfallfieber der Meerschweinchen. [**The Nature of Immunity in Relapsing Fever. IX. Significance of R.E. System in Relapsing Fever in Guinea-pigs.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Aug. 1. Vol. 62. No. 5/6. pp. 420–423. [5 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

This is an extension of their previous work on spirochaetosis in rats and mice to guineapigs. Seventeen guineapigs were splenectomized. Of these, 16 succumbed to later experimental infection with relapsing spirochaetes, while all 12 normal guineapigs withstood infection. They conclude, therefore, that the R.-E. system is the only protective system in so far as resistance to experimental spirochaetosis is concerned.

J. C. G. Ledingham.

NIESCHULZ (Otto) & WAWO-ROENTOE (F. K.). Ueber den Einfluss der Milzexstirpation bei Infektionen mit *Trypanosoma gambiense* und *Schizotrypanum cruzi*. [**Effects of Splenectomy on Infections with *T. gambiense* and *S. cruzi*.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 3/4. pp. 312–317. [6 refs.] [Inst. for Infectious Diseases & Parasit., Reich Univ., Utrecht.]

These authors have investigated the effect of splenectomy on the course of a trypanosome infection in dogs. Like KIKUTH and REGENDANZ (see previous reviews), but in opposition to KRITSCHESKI and SCHWARZMANN, they conclude that the spleen possesses a powerful influence on the course of infection of dogs with *T. gambiense*. With *S. cruzi*, on the other hand, extirpation of the spleen had no effect. Their opinion, therefore, is that the effects of splenectomy depend not only on the test animal employed, but also on the variety of test trypanosome.

J. C. G. Ledingham.

KRITSCHESKI (I. L.), BASKIN (M. M.) & LEBEDJEVA (M. N.). Ueber eine bisher unbekannte Funktion des retikuloendothelialen Systems. VIII. Zur Kenntnis der Funktion des retikuloendothelialen Systems, durch welche die Aktivität der ätiotropen Verbindungen im Organismus bestimmt wird. [**The Rôle of the R.E. System in determining the Effect of Chemotherapeutic Interference.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 64. No. 5/6. pp. 382–406. With 8 figs. on 2 folding plates. [Refs. in footnotes.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

This lengthy contribution is largely polemical, being concerned with criticisms by various writers of Kritschewski's main thesis that chemotherapeutic substances are taken up in the first instance by cells of the R.-E. system and are only slowly released therefrom to exercise their parasitotropic effects. The arrest of the substance by the R.-E. cells would, in fact, prevent a too rapid excretion of the drug from the body by the ordinary channels. This thesis is supported, in the authors' opinion, by the results of experiments designed to reveal directly this storage of the drug derivatives in the R.-E. cells by JANCsó's microchemical methods. Salvarsan and silversalvarsan, which are taken up by the R.-E. cells, are found to destroy trypanosomes when injected 5 days after the drug, whereas sulphoxylsalvarsan, which is not taken up by these cells, as microchemical tests show, has almost disappeared from the body by this time. What is left is incapable of keeping the infection in check. In splenectomized and blockaded animals, Jancsó's technique shows that salvarsan and neosalvarsan collect in the capillaries of all organs either owing to lack of histiocytes following splenectomy or to the fact that the remaining histiocytes are already blocked by the dye. Photomicrographs are supplied of organ sections (liver, spleen, lung, brain) from splenectomized and blockaded animals after intravenous injection of salvarsan, with a parallel series from normal animals.

J. C. G. Ledingham.

- i. KRITSCHESKI (I. L.) & FRIEDE (K. A.). Ueber eine bisher unbekannte Funktion des retikuloendothelialen Systems. IX. Ueber die Rolle des Retikuloendothels bei der Wirkung von Medikamenten und Giften. [**The Rôle of the R.E. System in the Action of Medicinal and Toxic Substances.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 3/4. pp. 254–263. [4 refs.]
- ii. — & SCHAPIRO (S. L.). Ueber die Natur der Immunität bei Rückfallfieber. XI. Ueber die Schutzfunktion der nicht mit Eisenzucker blockierten Histiocyten des ausserhalb der Milz gelegenen Teiles der retikuloendothelialen Systems. [**Protective Function of the Unblocked Histiocytes.**]—*Ibid.* pp. 264–275. [20 refs.]

i. In continuation of the efforts of Kritschewski and his collaborators to demonstrate the dependence of chemotherapeutic efficiency on the intactness of the R.-E. system (see many previous reviews), Kritschewski and Friede have sought to determine whether the action of chemical poisons like KCN and toxic alkaloids such as strychnine,

caffein and morphine is similarly influenced. Mice were splenectomized and 48 hours later the drugs were given subcutaneously (0.05 cc. to 1 gm. body weight). With most of the substances tested there was a considerably higher proportion of deaths among splenectomized than among normal mice. The authors' explanation of the phenomenon is that if the R.-E. system is intact, the toxic substances are first absorbed by the R.-E. cells and thereafter are only slowly let loose in diminished concentration, whereas if the R.-E. system is interfered with, the toxic substances get immediate access to vital organs *via* the blood stream.

ii. This paper deals with criticisms of the authors' view that in relapsing fever the R.-E. system is the chief locus of defence. A further set of experiments is placed on record in which the course of *recurrens* infection is followed in two sets of mice: (1) splenectomized mice subsequently blockaded intravenously with sugar of iron; and (2) splenectomized mice subsequently blockaded intravenously with sugar of iron and also subcutaneously with trypanblue. The further blockade with trypan blue effects, according to the authors, a more complete dislocation of histiocyte function. If the strain of spirochaetes is of low virulence splenectomy and blockade with sugar of iron may leave a sufficient number of functioning histiocytes to preserve life. The results of the experiments on the two groups of splenectomized mice supported the authors' contention.

J. C. G. Ledingham.

KIKUTH (W.) & REGENDANZ (P.). Ueber die Beziehungen der chemotherapeutischen Mittel zum "Retikuloendothel." [**Relation of Chemotherapeutic Substances to R.E. System.**].—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 61. No. 5/6. pp. 422-432. [10 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

In many papers (reviewed in this *Bulletin*) dealing with the influence of splenectomy and blockade on the action of chemotherapeutic substances, the authors have, as a rule, interpreted the observed diminution or complete abeyance of the usual drug effect as indicating that some special function of the R.-E. system to determine the efficacy of a drug has been put out of action by the operative procedure. Kikuth and Regendanz are not satisfied with this interpretation and they enquire here how far the diminished action of the drug in blockaded animals may be due simply to some loss of natural resistance, not necessarily expressed in terms of antibodies. If we assume that the destruction of the test organism is due to the combined action of the drug and the specific antibodies manufactured presumably in the spleen and R.-E. system, then the effect of the splenectomy would be to reduce the latter mode of defence. KRITSCHESKI had attempted to exclude any participation of specific antibodies by giving the drug before the appearance of parasites in the blood, but it is the opinion of Kikuth and Regendanz that, while specific antibodies can certainly be removed from consideration owing to the short period of infection, natural defence in the more general sense may be severely disturbed by the operative procedure. An infection would thus run a more severe course in the splenectomized animal. Kikuth and Regendanz for example found, in opposition to KRITSCHESKI, that removal of the spleen in rats may render a *T. lewisi* infection very severe or fatal.

In such animals also the action of the chemotherapeutic substance was greatly diminished. To secure further knowledge on this subject, Kikuth and Regendanz extend their work to larger animals, guineapigs and rabbits and find that in these splenectomy does not affect the course of infection with *T. brucei* or the normal action of germanin. They conclude, therefore, that the reduced effect of germanin on splenectomized rats and mice is due to loss of natural defence and not to the abeyance of a special function of the R.-E. system, as postulated by KRITSCHESKI. In rats and mice, which for their size have large spleens, interference with their function may have a much more serious effect on the course of an induced infection than it appears to have in the larger animals studied.

J. C. G. Ledingham.

LEGENDRE (J.). Défenses naturelles contre les moustiques (agrophylaxie et pisciculture.) [**Natural Means of Defence against Mosquitoes.**]*—Ann. de Méd. et de Pharm. Colon.* 1928. Jan.-Feb.-Mar. Vol. 26. No. 1. pp. 42-82. [18 refs.]

In this essay Legendre brings together much that he has published elsewhere. He deals with the employment of domestic animals for the protection of human beings from attack by mosquitoes and traverses once more the question of zoophilous breeds of these insects. There are notes on the replacement of one mosquito by another, the cultivation of fish in rice fields, the acclimatization and transport of special fish, and an outline of antimosquito work in Madagascar. The concluding paragraphs are a plea for the simplicity and usefulness of catching adult mosquitoes.

J. F. C. H.

LEGENDRE (F.). Inconvénients provoqués dans la lutte antilarvaire par l'emploi de demi-mesures concernant les terrains immergés. [**Failure of Half Measures in Antilarval Work.**]*—Bull. Soc. Path. Exot.* 1928. Apr. 18. Vol. 21. No. 4. pp. 346-347. [Antimalaria Service, Antananarivo.]

In Madagascar it was thought to protect the town of Antananarivo against anopheles by ordering the cessation of rice culture in a particular area. The law was complied with, but no measures for drainage of the area (150 hectares) were simultaneously arranged. Such half measures made the state of affairs worse than ever. The rice fields became a swamp, breeding anopheles in greater number than before.

J. F. C. H.

DUREN. La lutte antimoustique à Léopoldville. [**Antimosquito Work in Leopoldville.**]*—Ann. Soc. Belge de Méd. Trop.* 1928. June. Vol. 8. No. 1. pp. 41-46.

Leopoldville (East) has a mosquito squad consisting of 16 men and a foreman who deal with overgrowth of vegetation, 5 oilers and 5 searchers for breeding places. These are native employees and they

are reported to carry out their work efficiently and without serious annoyance to European residents.

Lists are given of the genera and species of larvae captured. In shaded places *A. smithii* is the prevailing anopheles and in cleared zones *A. costalis*. No satisfactory larvivorous fish has been discovered locally as yet.

J. F. C. H.

HAMLIN-HARRIS (Ronald). **The Relative Value of Larval Destructors and the Part they play in Mosquito Control in Queensland.**—

Reprinted from *Proc. Roy. Soc. Queensland*. 1929. July 26. Vol. 41. No. 3. pp. 23–38. With 19 figs. on 8 plates. [35 refs.] [Health Dept., City Council, Brisbane.]

This interesting study of Queensland's natural enemies of mosquitoes emphasizes the fact that this aspect of malaria control, like most others, is a local problem. Queensland is fortunate in possessing some very efficient larvivorous fish effective in fresh, brackish and salt water, and local fish seem likely to control mosquito breeding in irrigated rice fields, at least in the early stages of the cultivation. Towards the end of the rice season the rate of mosquito multiplication seems to outrun the appetites of their many enemies. Artificial stocking with larvivorous fish would perhaps redress the balance.

J. F. C. H.

DUREN. Note sur l'emploi de la créoline comme larvicide. [**Creoline as a Larvicide.**]—*Ann. Soc. Belge de Méd. Trop.* 1928. June. Vol. 8. No. 1. pp. 23–25.

Laboratory experiments were made with "créoline" [not further specified, but stated in "*Larousse*" to be *huile lourde du goudron*], and the minimum proportion for application to water breeding larvae is stated to be 2/10,000 or 200 gm. per cubic metre, renewed every 10 days. It is too expensive for use in deep water, but is recommended for application to shallow water of considerable surface. [Nothing is said of possible effects on vegetation, fish, domestic animals or man.]

J. F. C. H.

WALLACE (R. B.). **Reduction in Oiling at Certain Seasons.**—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 92–96. With 1 text fig. [1 ref.]

This is an account of a short experiment undertaken to ascertain whether the oiled area could safely be reduced from one half to one quarter of a mile on an estate in Malaya during the season when malaria appeared to be little prevalent. The work is described as only a preliminary trial, but it suggests that there is a season when *A. maculatus* is less dangerous than at other times.

During the period of limited oiling *A. maculatus* increased outside the quarter-mile radius with no increase in the malaria rates and an appreciable saving in oiling costs.

J. F. C. H.

GINSBURG (J. M.). [**Studies of Mosquito Oils and Dust Larvicides.**]—*Proc. 15th Ann. Mtg. New Jersey Mosquito Exterm. Ass., Atlantic City, 1928.* New Brunswick, N.J. 1928. pp. 53–65. [3 refs.] [Summarized in *Rev. Applied Entom.* 1929. July. Vol. 17. Ser. B. Pt. 7. pp. 137–138.]

A study of various oils has indicated that an oil for antimosquito use should possess approximately the following characters:

Specific gravity—32–37° Bé.

Flash point—150° F.

Cold test—0° F.—pour.

Boiling range—350–675° F.

Color—Straw to Yellow.

Viscosity—50–100 Sayb/100.

Surface tension—20 dynes per cm.

The tests were made upon various culicines in brackish and fresh water. The importance attaching to some of the above characters is indicated. Lethal action upon mosquito larvae was not the only quality considered, such factors as ease, safety and pleasantness in handling also influencing the choice.

Some larvicidal powders were tested. Stoxal was not effective, but a dust known as "No. 15" and said to consist of "Kaolin saturated with about 20 per cent. fuel oil and 6 per cent. high-boiling point hydrocarbons" gave satisfaction.

J. F. C. H.

BAUVALLÉ (H.). Essai de lutte antilarvaire par l'emploi de poudre larvicide, dans une zone inondée du Bas-Dahomey. [**Antilarval Measures with Stoxal in a Flooded Area.**]—*Bull. Soc. Path. Exot.* 1928. Apr. 18. Vol. 21. No. 4. pp. 323–325. With 2 text figs.

An account of an apparently successful use of stoxal as a larvicide. [The details given are meagre and the evidence of the efficiency of the powder is unconvincing.]

J. F. C. H.

SCHUURMAN (C. J.) & HUININK (A. Schuurman-ten Bokkel). **Application of Paris Green as an Anopheles-Larvicide (Second Report).**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1929. Vol. 18. No. 1. pp. 143–150. With 2 plates. [1 ref.] [Med. Lab., Weltevreden.]

This careful study adds to the evidence already available as to the efficiency of Paris green as a larvicide and its harmlessness to domestic animals. In connexion with the latter point fish living in the treated ponds were analysed for their arsenic content which, after the use of the green for 5 months, was such that it would be necessary to consume 22.5 kgm. of fish to take 5 mgm. of arsenic. For a like dose of arsenic it would be required to drink 125 litres of the pond water.

J. F. C. H.

BRAIMBRIDGE (C. V.). **Some Remarks on the Relation between Rainfall and Prevailing Diseases in Nairobi.**—*Kenya & East African Med. Jl.* 1929. June. Vol. 6. No. 3. pp. 73-74. With 3 charts on 1 folding plate.

The monthly rainfall and the monthly admissions to hospital for malaria, dysentery and lobar pneumonia are charted for the three years 1923-1925. The data are insufficient to justify any conclusions [including even the very cautious remarks of the author.]

J. F. C. H.

LEITCH (J. Neil). **A Health Campaign among 7,000 Tea-Garden Coolies.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 1. pp. 641-652. With 2 text figs., 5 figs. on 1 plate & 2 folding charts.

There is nothing very novel in this paper, but those in circumstances similar to the author's, who wish to reorganize their work on preventive lines, will find Dr. Leitch's arrangements helpful.

J. F. C. H.

JACOCKS (W. P.). **A Note on a Type of Latrine Suitable for Use in Ceylon Villages.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1929. Feb. 13. Vol. 2. Pt. 2. pp. 87-89. With 3 plates.

Jacocks recommends the use of a squatting plate of galvanized steel of length 3 ft. 8½ in., breadth 2 ft. 2½ in., thickness, 18 gauge. The dimensions "represent the most economical cutting of the galvanized sheets." The hole is machine-punched and measures: back, 6½ in.; front, 5½ in.; length, 16 in., and should be 10 in. from the back of the plate. The cost of such a plate in Ceylon is Rs. 4 or less.

[The author tilts against the undue cost of many latrine recommendations in relation to poor villagers' means, but of his own recommendation he says "it is quite possible that the cost . . . might be beyond the purchasing power of the villager."]

J. F. C. H.

LOW (G. Carmichael). **Presidential Address. A Retrospect of Tropical Medicine from 1894 to 1914.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 213-232.

This retrospect must be read in its entirety. It will be sufficient here to give Dr. Low's headings—Malaria (1894-1898); the Foundation of the Schools of Tropical Medicine (1898-1899); Filariasis (1899-1900); Yellow Fever (1900-1901); Trypanosomiasis (1901-1903); Ankylostomiasis (1901-1902); Kala Azar (1903-1904); Undulant Fever (1904); Schistosomiasis (1904-1907); the Use of Intravenous Antimony (1906-1914); the Foundation of the Society of Tropical Medicine and Hygiene (1907); Plague (1907); Beriberi (1907-1909); the Use of Emetine (1911-1912). Dr. Low thinks that some of the most remarkable discoveries ever made in medicine, both in the etiology and treatment of disease, were recorded during the period 1894 to 1914, and few will be found to dissent.

A. G. B.

ROUSSEAU. Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat, pendant l'année 1927. [**Transmissible Diseases in the French Colonies and Mandated Territories in 1927.**—*Ann. de Méd. et de Pharm. Colon.* 1929. Apr.-May-June. Vol. 27. No. 2. pp. 145-246. [1 ref.]

The introductory statement tells us that 1927 was memorable chiefly for the recrudescence of cholera in Indo-China, the severe epidemic of yellow fever in French West Africa and the increased activity of plague in the same region. On the other hand smallpox is tending to disappearance, and plague is decreasing in Madagascar and Indo-China. An epidemic focus of sleeping sickness came to light in Togoland. The author expects to see the arrest of this disease in Equatorial Africa and Cameroon before long.

The diseases are then considered in turn under the headings :—

Malades pestilentielles (plague, cholera, yellow fever, typhus, smallpox).

Maladies endémo-épidémiques (malaria, blackwater, dysentery, trypanosomiasis, dengue, relapsing fever, intestinal parasitism, schistosomiasis, filariasis, dracunculosis, beriberi, phagedenic ulcer, yaws).

Maladies transmissibles communes à la métropole et aux colonies (pneumococcus infection, cerebrospinal meningitis, influenza, enteric, measles, diphtheria, scarlatina, mumps, varicella, trachoma, rabies).

Maladies sociales (tuberculosis, V.D., leprosy, cancer). Naturally the information under some heads is much greater than under others.

A. G. B.

INTERNATIONAL LABOUR REVIEW. 1929. July. Vol. 20. No. 1. pp. 95-109. [3 refs.]—**The Protection of the Health of Groups of Native Workers in the French Colonies.**

An account is given of a remarkable report by Dr. HECKENROTH, who stresses the enormous effort of organization, finance and charity required to protect native workers. Increasing shortage of native labour makes the matter urgent ; the native population is being reduced yearly by 4 to 20 persons per 1,000. A native recruited for industry must be so watched over as to render his condition similar to benevolent slavery, whether he be employed near his home or at a distance.

Reduction in organic resistance occurs in workers who leave their own district ; transplantation produces profound physical and moral disturbance, quite apart from exposure to infectious diseases to which they are unaccustomed and hence liable to succumb.

A native is attached to his own kin, customs, village and field. Too intensive recruiting may compromise a district, so that land falls out of cultivation and small local industries die out. Transport, whether by road, train or water, is fraught with dangers. The workers must be housed, fed and clothed ; each calls for scientific study. Ill-nourished, without suitable dwellings, improperly clad and lacking medical care, native labour must have a terrible mortality. Contracts should be short and repatriation strictly observed. Rations should be issued in kind to prevent economizing on food. Allotments, cultivated by the workers, are to be encouraged ; but native foods must be analysed to determine their calorie and vitamin values. Natives should be housed according to their customs, precautions being taken against cold at night. Clothing should be the responsibility of the employer. Epidemic and endemic disease can only be controlled by

organized hygiene carried out by employers. The subject is in its infancy; but much is known, and something is already being attempted to ensure that natives can be safely employed in industry.

E. L. Collis.

BULLETIN OF THE RUBBER GROWERS' ASSOCIATION. 1929. Sept. Vol. 11. No. 9. pp. 639-648. With 1 text fig.—**Central Health Board. A Summary of the Organization under the Health Boards Enactment No. 7 of 1928.**

It is impossible to condense this interesting account of administrative medical arrangements in Malaya, but it is well worth reading by all who are faced with similar problems. The guiding principles of the Enactment are as follows :—

" (i) It is primarily the duty of every landed proprietor to carry out proper and reasonable preventive measures on his own land.

" (ii) That an equal standard of health control shall be adopted for the whole of the Federation."

" (iii) That estates which can prove that the work done in the past towards health control has been sufficient to raise them to the required standard shall be exempt from the new cess for health purposes."

The new organisation provides that :—

" (a) Each estate will have a hospital to which to send its patients.

" (b) A Registered Medical Practitioner will visit all estates and carry out measures of prevention of disease.

" (c) Schemes of measures of prevention of disease will be framed where necessary to co-ordinate work between estates and for the control of lands adjoining estates.

" (d) Later when health conditions on estates and the land adjoining estates have been made satisfactory, measures for the improvement of health could be extended to the remote kampong areas, when trained men and a knowledge of detailed requirements is available."

J. F. C. H.

LEGENDRE (J.). Colonies et démographie. [**Colonies and Demography.**]—*Ann. de Méd. et de Pharm. Colon.* 1928. Oct.-Nov.-Dec. Vol. 26. No. 4. pp. 395-408.

A well-written plea for the improvement of the demographic records of colonial possessions. The author urges the desirability of an agreement between the great colonizing states to the end that uniform mortality and morbidity statistics of isoclimatic zones might be prepared. He cites and comments on some demographic data of French possessions, pointing out the difficulties of interpretation. Thus the European population of Hanoi show a considerable natural increase, much greater than that of France herself, but the direct comparison is vitiated not only by the wholly different age constitution of the population, but also by the fact that not only the residents in the town but other white women in the province come to Hanoi for their confinements.

The author concludes that the black races when brought into contact with whites have a higher rate of natural increase than when isolated.

M. Greenwood.

FISCHER (W. O.). **A Preliminary Report on 1,402 Consecutive Autopsies on Native Mine Workers.**—*Jl. Med. Assoc. South Africa.* 1929. Sept. 28. Vol. 3. No. 18. pp. 511-516.

The autopsies which are the subject of this paper were made in the period 1922-1928 at the City Deep Central Native Hospital, 663 of them by the author. The patients at this hospital are male natives in the 2nd, 3rd and 4th decades from either the Union of S. Africa or the southern part of Portuguese East Africa. From a table which shows the principal causes of death the table given here (No. 1) is an abridgement.

TABLE I.

Year.	Total deaths from diseases.	Autopsies performed per year.	Tuberculosis total.	Lobar pneumonia.	Broncho-pneumonia.	Enteric fever.	Amoebic dysentery.	Bilharziosis.	Epidemic cerebro-spinal meningitis.	Pneumococcal meningitis.	Carcinoma.	Chronic nephritis.	Acute pericarditis.	Miscellaneous.
1922	148	84	25	23	9	4	—	1	11	—	2	—	2	7
1923	226	159	27	47	12	19	—	2	13	—	—	2	4	30
1924	257	167	45	58	16	9	1	1	1	1	1	2	3	24
1925	190	155	46	49	7	12	2	—	12	4	1	1	3	13
1926	242	215	51	90	18	10	1	2	15	2	—	2	3	15
1927	329	316	64	101	32	25	4	4	35	3	1	2	3	37
1928	326	306	44	100	31	41	7	5	15	4	6	1	2	41
Total	1,718	1,402	302	468	125	120	15	15	102	14	11	10	20	167

Table 2 gives the percentages to the total deaths of the four chief causes of mortality.

TABLE II.

Year.	Lobar pneumonia vs. Broncho-pneumonia.	Tuberculosis.	Enteric fever.	Epidemic cerebro-spinal meningitis.
	Per cent.	Per cent.	Per cent.	Per cent.
1922	38.1	29.8	4.76	13.1
1923	37.1	17.0	11.9	8.2
1924	44.3	26.9	5.4	0.59
1925	36.1	29.7	7.7	7.7
1926	50.2	23.7	4.7	6.97
1927	42.1	20.3	7.9	11.1
1928	42.8	14.4	13.4	4.9
	42.2	21.5	8.6	7.3

79.6 per cent. of all autopsies.

Note that while the ratio of deaths from tuberculosis has decreased that for pneumonia has increased.

Lobar Pneumonia.—468 deaths, or 33·3 per cent. ; in 173 cases the pneumonia was double. The gross pathological changes were invariably those of a pneumococcal infection. A table shows the number and percentages of involvement of the various lobes. Some degree of pleural inflammation was always present ; acute fibrinous pericarditis in 11·5 per cent.

Tuberculosis.—302 deaths. This is classified under 12 heads ; the commonest forms were acute miliary (136 cases), pulmonary (48), general (42), pulmonary with silicosis (30), abdominal (22). A feature of the miliary tuberculosis cases was enlargement of the spleen, which in 56 cases weighed 500 gm. or more ; the majority of these patients were from P.E.A. Among the rarer headings there were 2 cases of tuberculous liver abscess.

Enteric Fevers.—120 deaths. In 29 cases there was extensive sloughing on the ileo-caecal valve. A table shows that the chief complications were, broncho-pneumonia (56 cases), peritonitis following perforation (24), acute nephritis (12), intestinal haemorrhage (8).

Other rarer Diseases.—Under dysentery it is stated that of 18 cases in which dysentery was the cause of death, in 15 *Ent. histolytica* was found. Eleven of the natives were from the East Coast, which also provided the 4 cases of amoebic liver abscess. Ankylostomiasis was regarded as the cause of death in 4 cases ; in 17 others there were many hundreds of these worms, and it is noted that in every instance death was due to a lung disease—pneumonia or tuberculosis. Schistosomiasis accounted for 15 deaths, and ova or worms were found in 258 cases, which the author thinks much understates the real incidence. Of the 13 cases of malignant tumour, 11 were carcinoma (9 of the liver). It is further noted that multilobular cirrhosis of the liver was found in 10 per cent. of East Coast natives and in 2·5 per cent. of Union natives, and that chronic nephritis “ of the intestinal type ” was present in 15·8 per cent. of East Coast and 11·3 of Union natives. [The author gives no indication of the relative numbers of these two classes.]

A. G. B.

CHOISSER (R. M.). **Pathology in the Tropics. A Study based on the Review of 700 Consecutive Autopsies in Haiti.**—*U.S. Nav. Med. Bull.* 1929. July–Oct. Vol. 27. Nos. 3–4. pp. 551–568. With 15 figs. on 8 plates.

The author has for three years been pathologist to the Haitian General Hospital, Port au Prince, to which Haitians from all over the Republic are admitted, the great majority of pure-blooded African type. He presents a review of his first 700 autopsies.

Respiratory System.—Pulmonary tuberculosis accounted for 26 per cent. of all the deaths. The author notes that if this high mortality rate were to result from some acute disease great anxiety would be felt and remedial steps would be taken, but with tuberculosis it is not so. During his three years he has not seen a case of arrested pulmonary tuberculosis in a Haitian. Most cases occur between 20 and 30 years and the disease runs its course in 5–6 months. The necropsy findings fall into three well-defined groups: (1) Ulceration and cavity formation of both lungs with extensive miliary lesions of all organs ; lungs almost

completely destroyed; (2) a similar picture, but the disease is limited to the thorax; (3) small cavities in the lungs; all viscera above and below diaphragm stuffed with miliary tubercles. Lobar pneumonia accounted for 55 persons, or 8 per cent.

Gastro-intestinal System and Helminthiasis.—Diseases of this system killed 33 or 4·7 per cent. of the cases; 13 were typhoid. There was no case of bacillary or amoebic dysentery, but amoebic dysentery and balantidiasis have been seen in the wards. One case of acute gastritis and three of gastric ulcer were noted, on which the author comments that the common use of alcohol and highly seasoned food do not seem to predispose to that condition. Acute peritonitis and carcinoma of the stomach made up this series. Only 9·7 per cent. showed worms, which is attributed to the fact that routine worm treatment is given on admission. The species were round and whip worms and Necators; no Old World species of the hookworm were found. Two cases of heavy strongyloides infestation are described, in which profuse diarrhoea was followed by emaciation, exhaustion and death; no other cause could be found for death.

Liver and Spleen.—There were 5 cases of cholelithiasis and 10 of cirrhosis, but of these last 7 were relatively mild and secondary to other diseases; one case of primary carcinoma of the liver and two of secondary carcinoma. Many of the enlarged spleens were believed to be malarial, but smears were not made from all; 15 per cent. of patients admitted harbour malarial parasites. The average weight of the spleens was 180 grams.

Genito-urinary System.—Chronic interstitial nephritis heads the list with 61 deaths, 8·7 per cent. Though many cases of "renal colic" are reported, in only one instance was a renal calculus found.

Diseases of Nervous System.—There were 18 deaths from meningitis, 2·5 per cent. of the whole, 12 due to the pneumococcus, 5 to the meningococcus and 1 to tubercle; of the pneumococcus cases 10 followed infection of the middle ear. Spontaneous intracranial haemorrhage was found in 5 cases, 3 in young adults infected with yaws, and 2 in old people with serum reaction 4+.

Cardio-vascular System.—Only 2 cases of mitral endocarditis, both of ulcerative type; and 4 cases of chronic mitral disease which produced no symptoms in life. The author thinks these findings extremely low, specially since focal infection is present in almost all persons admitted. He notes that acute rheumatic fever is practically never seen.

Malaria.—Six deaths, all malignant tertian. The patients were admitted in coma and thick blood film showed abundant *P. falciparum*, but no crescents.

"The brains upon examination were pinkish gray in color, edematous, and firm to touch. When sectioned the white matter was congested and showed numerous scattered areas of punctate hemorrhages. Smears from the brain substance, stained with Azur-II eosin, showed the capillaries engorged with pale red cells containing young gametes. The parasites were rather large, oval in shape, with a thick pale blue cytoplasm and a central clump of pigment. These forms of the parasite are called by Dr. H. C. Clark, director of the laboratories of the Gorgas Memorial, sexual ovoids. They are found only in the brain, spleen, and bone marrow, apparently never invading the peripheral blood stream."

The author suggests that the parasites may attain full development in the spleen and marrow (where crescents were found) but not in the

brain, "as their large size blocks the capillaries producing infarction and death before the parasite has time to attain full development."

Malignancy.—The author disagrees with those who state that cancer is extremely rare in people of the African race. His figures correspond closely to those of the Congo. 27 deaths, or 3·8 of the whole, were due to malignant tumours, 24 from carcinoma and 3 from sarcoma. The cancer cells were of embryonic, anaplastic type, and one would expect early metastases, but such were rarely observed.

Yaws.—90 per cent. of the bodies showed evidence in the arterial system of "treponematosis," but whether yaws or syphilis is uncertain. There were 10 definite cases of yaws, with negative history of syphilis and no scars on the genitalia; in 8 of these was aortic aneurysm, in one a gumma, and in one a spontaneous cerebral haemorrhage. The pathology, however, of these cases and those of "treponematosis" was so similar that they could not thereby be differentiated. This section will be treated more fully elsewhere.

A. G. B.

MELHORN (K. C.). **Public Health in Haiti. A Résumé of 10 Years' Work.**—*U.S. Nav. Med. Bull.* 1929. July–Oct. Vol. 27. Nos. 3–4. pp. 568–573.

This short article, packed with information, gives an account of the work of the U.S. Naval Medical Corps in Haiti since the National Public Health Service was created by law in February, 1919. Up to the time of the American occupation little had been done. The country was mountainous, and almost without roads, with a population of two millions, mostly illiterate. Such public health service as existed was poorly financed. The article describes the organization set up, hospitals, rural clinics, disposal of refuse, control of mosquitoes and malaria, and of water-borne diseases, the school of medicine, hospital training, training of nurses, school health service, health centres. Twenty United States naval medical officers are employed. The country now possesses 11 modern hospitals with capacities of from 60 to 400 beds. To combat the three most serious disease conditions—yaws, malaria and intestinal parasites—a system of rural clinics was inaugurated in 1926; they number 142 and in 1928 the total consultations and treatments exceeded 866,000. Travelling clinics have lately been provided. The capping of springs and installation of chlorination units has led to a great reduction of enteric fever at Port au Prince. By the reorganization of the National School of Medicine with the aid of the Rockefeller Foundation Haiti possesses "a unit second to none in the public health service," of which the Haitians are taking full advantage. From the training school for nurses, formed in 1918, 81 have graduated. Of the school health service the author writes: "Gratifying, indeed, is it to witness the eagerness with which students, parents, teachers and the press are becoming interested in the cardinal principles of hygiene and sanitation."

A. G. B.

BURKE (Alice M. B.). **Report of the Pathology Department of the School of Tropical Medicine for the First Three Years ending April 15, 1929.**—*Porto Rico Jl. of Pub. Health & Trop. Med.* 1929. Sept. Vol. 5. No. 1. pp. 48–53.

In the first three years of the work of the Pathology Department specimens from 1,950 surgical procedures were received from 137

physicians in the Island. There were 225 autopsies, a significant number when it is recalled that prior to the opening of the Tropical School a complete post-mortem examination was a rarity in Porto Rico. In a San Juan hospital the percentage of autopsies exceeded 50. A table shows the frequency of some tropical diseases in the 225 cases :—

Uncinariasis	...	...	44	Leprosy	...	...	7
Schistosomiasis	...	...	30	Sprue	...	...	4
Trichuriasis	...	...	30	Filariasis	...	...	3
Malaria	...	...	13	Pellagra	...	...	3

In most cases they were but contributory causes of death ; e.g., of the 13 malaria autopsies the plasmodium was the lethal agent in seven. Not a single instance of dysentery, bacillary or amoebic, was encountered. Other conditions absent were rheumatic heart lesions. Aortic disease of luetic origin occurred 22 times with six aneurisms. There were 48 instances of broncho-pneumonia and 14 of lobar pneumonia. For tuberculosis, the character of the lesions and their distribution shows no essential difference from what is seen in U.S.A. [No figures given here.] An unexplained phenomenon was the frequency of a marked eosinophilic infiltration of tissues, especially the appendix and other parts of the intestinal tract. In the general statistics one notes 142 tonsillectomies, 163 appendectomies, 319 malignant tumours and 202 benign tumours. Statistics of the nature and location of the tumours are added. [The population of Porto Rico in 1920 was, white, 948,000 ; black, 49,000 ; mulatto, 301,000. No figures of race are given in Dr. Burke's paper.]

A. G. B.

HASLAM (J. F. C.). **Some Health Problems of British Guiana.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 119–144. With 1 map & 9 figs. on 5 plates. [1 ref.]

This is a very readable address illustrated with some good photographs. After an account of the country and people (11 pages), in which the difficulties of the health officer are clearly brought out, the author considers in turn housing, water supply and sewage disposal. All have their special problems in a country in which the coast lands, where the bulk of the population is found, are mostly over 4 feet below the high level of spring tides. It may be hoped that recent changes will make it impossible in the future to write : "There are ninety-nine rural areas with their own local authorities who, from ignorance, indifference, or it may be interest, do not, or cannot, administer the powers conferred upon them." Diseases are not considered in this paper, but hookworm prevention is touched on. Dr. Haslam favours efficient, periodical mass treatment with diagnosis of the disease (as distinguished from the infection) by symptoms and the examination of a single smear.

A. G. B.

MENK (W.). *Infektionskrankheiten in Zuckerplantagengebieten der Provinz Oriente de Cuba.* [**Infectious Diseases in Sugar Plantations in Cuba.**]—*Zent. f. Bakt. I. Abt. Orig.* 1929. Oct. 31. Vol. 114. No. 4/6. pp. 345–354.

The author is Bacteriologist and Radiologist at the Baner Division Hospital, Cuba, of the United Fruit Company of America. He has reported in the Annual Reports for 1926, 1927 and 1928 of the Medical

Department of that Company the results of his work. The total number of cases and deaths in hospital were: In 1926, 3,945 and 103; in 1927, 2,157 and 105; in 1928, 1,721 and 62.

The morbidity and case mortality percentages of the various diseases observed in 1928 were: Malaria 18.3 and 0.3, external causes (wounds and accidents) 23.5 and 0.7, bronchitis 3.5, venereal diseases 4.3, phlegmon and acute abscess 3.8, pneumonia 3.1 and 31.5, ancylostomiasis 2.0, blackwater fever 0.4 and 14.3, cutaneous ulcers 0.6, typhoid fever 2.2 and 10.5, pulmonary tuberculosis 1.5 and 44.4, appendicitis and typhilitis 2.6 and 2.3.

E. D. W. Greig.

JAMAICA. Report of the Co-Operative Public Health Work in Jamaica during 1928 [WASHBURN (B. E.), Director].—8 pp. With 1 map in text. 1929. Kingston.

Jamaica is fortunate in having arranged with the International Health Division of the Rockefeller Foundation to conduct a co-operative health campaign. Dr. Washburn here outlines the developments which have been possible. These are such as many health officers in the tropics visualize but never see.

Jamaica is advancing from generalized health work to the tackling of definite problems, and is particularly fortunate in having the co-operation and support of the Foundation's officers in conducting surveys regarding malaria and tuberculosis as a preliminary to attacking these diseases.

Dr. Washburn himself has been responsible for the work of health education and in this very important branch he has achieved quite evident success.

J. F. C. H.

FABRE (J. A.). Etude sur la mortalité à Pointe-à-Pitre (Guadeloupe), du 1er juillet 1923 au 30 juin 1928 (5 ans). [Vital Statistics of Pointe-à-Pitre, 1923-1928].—Ann. de Méd. et de Pharm. Colon. 1928, Oct.-Nov.-Dec. Vol. 26. No. 4. pp. 426-434.

This is a study of the vital statistics of Pointe-à-Pitre (Guadeloupe) for the quinquennium 1923-28. The crude rate of mortality (persons) was 18.99 per 1,000 living; the ratio of deaths in the first year of life to live births was 13.5 per cent., a figure above the average for France; the ratio of deaths at ages 1-7 years to births was also above the French average; at later ages the mortality did not appear to differ greatly from that of the mother country. The author, using a somewhat arbitrary coefficient of salubrity, concludes that mortality is higher in those parts of the town where hygienic rules are least observed. As the annual deaths exceed the births, the population is maintained by immigration.

M. Greenwood.

SOREL (F.). L'oeuvre sanitaire de la Circonscription de Dakar et dépendances pour la protection de la santé publique (1927-1928). [Sanitation at Dakar].—Bull. Soc. Path. Exot. 1929. May 8. Vol. 22. No. 5. pp. 368-377.

In recent years the French port of Dakar has been visited by serious outbreaks of plague and of yellow fever. The purpose of Sorel's paper

seems to be to show that there was much indeed in Dakar that was highly insanitary, but that works of sanitation had been begun before the plague and yellow fever of 1927-28 and that these works (and all they implied) played a part in bringing about the epidemics.

Early in 1927, he says, the simultaneous carrying out of great public works of several kinds (*travaux d'agrandissement, d'amélioration et d'assainissement*) had turned Dakar into one huge "works," and he recalls the opportunities for increase of stegomyia under such circumstances. In addition he admits that Dakar, free from yellow fever for 15 years, had deceived itself into thinking the disease had disappeared for ever, and he hints that CARTER's views on the spontaneous disappearance of yellow fever fostered this unfortunate belief.

A long account follows of the actual improvements in fundamental sanitary arrangements which have been carried out. [Disease outbreaks when large works are in progress in the tropics have been so common that they ought to be anticipated. Sorel repeats the well-worn story about the increased breeding-places for mosquitoes which the works provide, but he makes no mention of the factors of over crowding, population movements, aggregation of susceptibles, and the like, which were emphasized by CHRISTOPHERS as long ago as 1908 (*Sc. Mem. by Med. Officers of Govt. of India*, New Ser., No. 35, p. 2) and upon which modern epidemiology lays equal stress.]

J. F. C. H.

DUBOCCAGE. La natalité chez les Bakongo dans ses rapports avec la gynécologie. [**The Relation of the Birth-Rate in the Bakongo Tribe to Diseases of Women.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 265-274.

The author has recently spent twelve months at Kisantu in Bas-Congo and has studied those diseases of women in relation to childbirth which touch the grave problem of native depopulation. He had 150 hospitalized women under his care and has the impression that their gynaecological affections are as varied as in Europe. He describes the conditions seen with illustrative cases.

A. G. B.

SEIDELIN (Harald). Le travail médical des huileries du Congo belge pendant cinq ans. [**Medical Work of the Oil Companies of Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Dec. 31. Vol. 9. No. 4. pp. 285-305. With 26 figs. on 15 plates. [1 ref.]

The author published an earlier note on medical affairs in the Congo (*Bulletin of Hygiene*, 1927, Vol. 2, p. 75). Here he discusses in general terms the problems of medical assistance in that area. He concludes that the complete confidence of the natives has not yet been won by western medicine. Numerous excellent illustrations are given and many statistical tables.

[The latter are often of very little value from the omission of important data which it would seem quite possible to give. For example, in sickness data of employees the numbers of dispensary cases, hospital cases and deaths are given for many places, but the number of the employees contributing these cases is often omitted. One hears persons whose experience is mainly tropical casting doubt on the usefulness of including elementary statistical training in courses of

instruction for those going to the tropics, on the ground of the impossibility of securing reliable data in the tropics. Such instruction, if it did no more, might prevent the publication of tables which seem to promise valuable information, but are in fact almost useless.]

J. F. C. H.

McNABB (J.). Disease Incidence and Diet of Natives at Lake Magadi.—
Kenya & East African Med. Jl. 1929. Nov. Vol. 6. No. 8.
pp. 212-221.

This paper refers to the adult male natives who are employed at the Soda Works and remain on an average 6 months; their numbers varied in 1927 to 1929 between 725 and 844. They are medically inspected before arrival. The climate is hot and dry and there is no natural source of fresh water; this rules out ankylostomiasis. Though two species of *Anopheles* are found (*costalis* and *funestus*) and breed in water containing up to 2½ per cent. of soda, malaria is conveyed to only a slight extent; children have no enlarged spleens; so that malaria is practically non-existent. Employees unfit for work have to see the doctor. At present about one-sixth of them are housed in concrete buildings. The health of the settlement has steadily improved. For 1927-29 the death rate has been 5·7 per mille (enteric 4 deaths, malaria 2). A summary of cases treated in the hospital is given; it is remarked that diseases commonly associated with debility and under-nourishment, such as pneumonia, tuberculosis and ulcer, are not prominent. The ration provided is:—

" 2-lbs. maize meal daily.
2-lbs. meat and bone, weekly, in two portions.
2-lbs. beans and peas, weekly, in two portions.
Salt *ad lib.*"

This diet, the author remarks, is deficient as regards fresh vegetables and to a less extent fresh meat. Few supplement the diet at the shops and the green stuff obtainable outside is almost negligible. In fact, the natives seem to do not badly on it. In six months there was an average weight increase in one batch of 8·9 lbs. It is concluded that the diet is nearly adequate; the qualification is added because in 1928 6 cases of night blindness were treated and there have been cases of myositis and synovitis (9 and 20 in 1929) which have suggested deficiency; notes of one such are given.

A. G. B.

GANORA (Romualdo). Note sulle condizioni climatiche e patologiche della Dancalia e della Migiurtinia. [**The Climate and the Diseases of Dancalia and Migiurtinia.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Nov. 1. Vol. 10. No. 11. pp. 513-519. English summary p. 519.

The author was three years in these districts on the Coast of the Red Sea and the Gulf of Aden and he describes briefly the climatic conditions. The diseases met with occurred in the following proportions: Tropical ulcers 40 per cent., syphilis and venereal affections 21, gastro-intestinal and rheumatic 17, malaria 13, and ocular diseases 9 per cent. No other figures are given, but a few remarks are made on each.

Secondary and tertiary syphilis are frequent and cause much mutilation; tropical ulcers are associated with spirochaetes and fusiform bacilli (apart,

that is, from syphilitic ulcers); intestinal parasites, except perhaps *Ascaris*, are few, and gastro-intestinal disturbances are largely dietetic in origin. Malaria is generally subtertian and at the onset is often associated with vomiting and the passage of mucosanguineous stools, leading to a suspicion of amoebic dysentery; emetine, however, is ineffectual, whereas quinine acts like a charm. Ocular conditions are chiefly catarrhal conjunctivitis and trachoma. Other tropical diseases such as relapsing fever, undulant fever, dengue, climatic bubo, beriberi, and Madurá foot are occasionally seen.

H. Harold Scott.

CORREIA (Alberto Carlos Germano da Silva). Le climat et la nosographie de l'Inde Portugaise. [*Climate and Diseases of Portuguese India.*—*Arquivos da Escola Méd.-Cirurg. de Nova Goa*. 1929. Ser. A. No. 4. pp. 461-512. With 7 plates.

Portuguese India consists of three districts on the west coast of that peninsula of a total area of 1,638 sq. miles; of this Goa, with a population of 469,000 persons, has 1,469 sq. miles. The other districts, Damão and Diu, north of Bombay, are obviously of less importance. The littoral portion of Goa is flat, the inner hilly, rising to 700-1,100 metres above sea level. The author gives a detailed description of the territory, its geology, vegetation, seasons and meteorological conditions. He notes that April and May, coming between the monsoons, are characterized by extreme heat and low humidity. In Goa the littoral may be regarded as healthy, the hilly interior as unhealthy. He passes in review the chief diseases met with:—

Malaria is widespread and most severe on the foothills of the Western Ghats. It is at its worst as a rule after the rains, in September to November. Thirteen species of *Anopheles* are named. No case of blackwater has been recorded. The old capital of Goa, which boasted a quarter million inhabitants, is now deserted and uninhabitable owing to malaria. Details of the splenic index in many parts of Goa and the other districts are given and a table of malaria deaths from 1916-1927; the total, about 2,000, has not varied much from year to year.

A similar table for *tuberculosis* records about 500 deaths a year.

Enteric fevers are endemic, especially amongst the Hindus. The disease is most prevalent in September-November, but most fatal in April and May. Soil pollution is general. Deaths number 300-400 annually.

Venereal diseases are widespread, but no statistics are available.

Leprosy.—157 lepers are known [196 appears to be an error], 111 men and 46 women. It is said that the disease is freely introduced from British India and from Africa.

Smallpox.—The years since 1825 in which serious epidemics have occurred are listed. The disease is at its worst in the months March-June. This is the dry period and experience in Goa is in accord with ROGERS' observations in British India [see *Bulletin of Hygiene*, Vol. 2, p. 419]. The author is unable to trace with GRAHAM a 5-yearly periodicity.

Beriberi is only sporadic in Goa.

Cerebrospinal meningitis was shown to exist in Goa in 1927. It is at its maximum in September and October when the relative humidity is high, and at its minimum in the hottest and driest months, April, May and the first half of June.

Cholera is not endemic in Portuguese India, but is frequently introduced from Bombay. The first epidemic, in 1543, was described by Gaspar CORREIA. A long list of subsequent outbreaks is given. Big epidemics have almost always coincided with years of excessive rain, of which many instances are given.

Plague is not endemic in Portuguese India. There is record of it in 1635 in the old capital, and it reappeared in 1896. The epidemics which have recurred almost yearly since are described. In 1924 and 1927 it occurred in epizootic form.

A. G. B.

VAN DRIEL (B. M.). Eenige beschouwingen naar aanleiding van de sterftcijfers der contractarbeiders ter Oostkust van Sumatra over 1925 en 1926. [**Statistics of Mortality of Indentured Labourers in Sumatra.**—*Meded. Path. Lab. t. Medan-Sumatra*. 1928. No. 4. 69 pp. With 6 graphs. [47 refs.] [Summary appears also in *Bulletin of Hygiene*.]

In the introduction, the desirability of obtaining reliable mortality and morbidity statistics is stressed and a compliment is paid to the United Fruit Company which, it seems, is able to prepare an annual report on the health of its labourers comparable with military or naval reports. The first part of the report deals with causes of death in hospitals in 1925 and 1926; pneumonia and tuberculosis were responsible for 231 and 151 deaths in 1925, for 281 and 209 in 1926; in these years there were 17 and 20 deaths from cancer. There are many charts. The rates of (hospital) mortality in terms of the numbers of contract labourers are shown. In the next section, suggestions for the improvement of the statistics are discussed. In the last section results are compared with the rates or mortality observed in other tropical countries. The general conclusion is drawn that the conditions are increasingly favourable, that the labourers suffer a lower rate of mortality than the populations from which they are recruited.

M. Greenwood.

GOELAM. An Investigation into the Health Conditions of the Island Enggano, Res. Benkoelen, (25-30 June 1928).—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 1. pp. 153-163. With 5 figs. on 3 plates & 1 map. [5 refs.]

Goelam tells of his six days' visit to this island [off south-western Sumatra]. Early records (such as they are) indicate a steady diminution of the population, and recent, more reliable, figures confirm this. Earlier investigators have attributed the depopulation to close inter-marriage, practice of abortion, syphilis and other factors. The present author says that nowadays miscarriage is rare and wilful abortion never practised, but that there is among the women "childlessness in a considerable degree." The part played by venereal diseases in causing this relative sterility remains uncertain. Malaria is chronically endemic with high parasite index and moderate spleen index. Further enquiry is desirable and education in health matters must underlie any attempted improvement.

J. F. C. H.

GOCO (E.). **Common Diseases among Infants and Children in the Puericulture Centers of Manila.**—*Jl. Philippine Islands Med. Assoc.* 1929. Nov. Vol. 9. No. 11. pp. 385-396.

The data utilized are based upon the records of five puericulture centres established in the City of Manila from 1923 to 1928. A table gives the figures for each centre in each year; it is seen that 88,000 children were registered (37 per cent. under one year, 51 per cent. between 2 and 16 years), and 54,000 were accounted sick; only 2,000 died. Of the 88,000, 28.5 per cent. were 7 per cent. undernourished; 19 per cent. were 10 per cent. undernourished; and 10 per cent. were 15 per cent. undernourished, leaving 42 per cent. as normal [but the number of cases of "malnutrition" was considered too small to be worth a place in the table below?] The table shows the frequency of the diseases found.

Disease.	Total cases.	Percentage.
Respiratory diseases	8,667	15.9
Skin diseases	5,661	10.2
Conjunctivitis and trachoma	3,468	6.4
Intestinal parasites	3,285	6.0
Nasopharyngeal obstruction, adenoids, tonsil and sinus enlargement	3,240	5.9
Infantile beriberi	2,739	5.0
Whooping cough	593	1.0
Gastro-enteritis	581	1.0
Measles	497	0.9
Malaria	468	0.8
Dysentery	336	0.6
Otitis media	248	0.4
Multiple abscess	175	0.3
Nephritis	227	0.4
Tuberculosis, general form	159	0.2
Stomatitis, simple and aphthous	136	0.2
Parotiditis epidemica	123	0.2
Others	23,496	43.4

[The number of "others" detracts much from the value of the figures.] Diseases represented by "only a few cases" were: syphilis, yaws, tropical ulcer, rickets and scurvy, umbilical tetanus.

A. G. B.

CRICHLLOW (N.). **The Prevalent Diseases of the British Solomon Islands.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 179-184. [1 ref.]

The author is Travelling Medical Officer of the British Solomon Islands Protectorate, with a population of some 150,000. He gives a general account of the diseases met with. *Malaria* is widespread. The spleen-rate under twelve is given as 80, and over twelve as 40, the parasite rate in children as 80 (benign tertian 70, subtertian 20, mixed 10). [The number of observations is not given; nor is it stated

whether these figures apply to one or several islands of the group.] SAYERS, of New Georgia, has found quartan parasites in native children [this *Bulletin*, Vol. 26, p. 369]. In 1928, 187 cases of malaria were treated at the Government Hospital, Tulagi. *Blackwater* was rare before 1915; 6 out of 18 deaths of Europeans in 1926 and 1927 had this cause. A case of a "blackwater fever house" is briefly cited. "All the usual" *pulmonary diseases* are met with. Among indentured labourers they are responsible for 20 per cent. of the deaths; pneumonia is not specifically mentioned. *Tuberculosis*, pulmonary, glandular and arthritic, is prevalent. *Dysentery* is responsible for a heavy death-rate; the prevailing type is bacillary; no widespread epidemic since 1915. *Yaws* is the commonest disease. On Malaita the incidence is 60 per cent. Salt water natives show a higher incidence than bush natives. *Yaws* is responsible for a high infant mortality. *Filariasis* is fairly common, elephantiasis rare. A survey showed 15 per cent. to harbour filarial embryos in the blood [*? bancrofti*]. The usual *intestinal parasites* are widely prevalent. The extent of *leprosy* is unknown. *Gonorrhoea* and *granuloma venereum* occur, but syphilis has not been diagnosed. *Tropical myositis* is present and is usually assigned, without proof, to a filarial origin. [BUXTON doubts whether filaria has any relation to myositis (this *Bulletin*, Vol. 26, p. 437).] The most common *skin diseases* are tinea imbricata and scabies. *Measles*, apparently introduced in 1914, was epidemic in 1927 and 1928, but rarely causes death. *Anterior poliomyelitis* was epidemic in 1925 and was very fatal to indentured labourers. *Beriberi* has practically disappeared. *Ascites* with great enlargement of spleen occurs and is attributed to yaws. Diseases not known to exist are smallpox, scarlet fever, cholera, plague and possibly diphtheria and typhoid.

[The value of this paper would have been enhanced by the inclusion of actual numbers of cases, without which percentages may easily mislead.]

A. G. B.

BARBIER. L'assistance médicale aux îles Wallis et Futuna. [**Medical Assistance in the Wallis and Futuna Islands.**—*Ann. de Méd. et de Pharm. Colon.* 1929. July–Aug.–Sept. Vol. 27. No. 3. pp. 441–453. [1 ref.]

[The Wallis Archipelago, a dependency of New Caledonia, lies to the north-east of Fiji and west of the Samoa group (at 176–178° E.), has an area of 40 square miles and a population of 4,500. Futuna (not the Futuna of the New Hebrides), with 1,500 inhabitants, lies south of the Wallis Islands.]

These islands had a resident doctor between 1905 and 1909, Dr. VIALA, who put his observations on record in a very interesting paper (1909). There followed an interregnum of 15 years when, in 1924, the author was appointed. He reports that two diseases dominate the pathology of these islands—filariasis and syphilis with yaws. As to filariasis, he believes that in Wallis all the natives and almost all the 15 Europeans are infested; at Futuna the incidence is less. One case of chyluria was seen, but none of lymph scrotum or chylous hydrocele. The ordinary form of hydrocele is common. Almost the only manifestation is elephantiasis, attacking usually the lower limbs,

then in order of frequency the scrotum, and lastly the arms and in females the breast. Collections of pus, sometimes seen, always contained streptococcus.

Syphilis and yaws. The author has treated 280 cases of syphilis, i.e., about 5 per cent. of the population. Chancre was not seen and secondaries but rarely. Among tertiary symptoms a form extremely widespread is a symmetrical keratoderma of the palms and soles, accompanied by a slowly progressing pseudovittiligo. Very few natives escape yaws. The children infect themselves at the end of the first year by reason of the universality of itch; they crawl about, and infect their lesions from other members of the family. In 19 months he treated 750 yaws cases, nearly all in children.

Malaria is non-existent in these isles; Anopheles seem to be absent. [BUXTON points out that south and east of the New Hebrides (about 170° E.) anopheles and malaria are absent.]

Leprosy is present in 2.2 per cent. of the inhabitants of Wallis at least, for these were all bacteriologically positive. No case has been seen in Futuna. However, a large number of people have claw-hand (main en griffe) suggestive of leprosy. There is no other sign. The cubital gland is normal to palpation; anaesthetic areas and maculae are absent; atrophy of the thenar and hypothenar eminences is nil or scarcely marked except in very old cases. All the movements of the thumb are generally preserved, the contraction affecting the digits. People have been seen who have had this deformity unchanged for 30 years. The author asks, Is this leprosy? If so, its virulence is much attenuated.

Tuberculosis. Cases are numerous, but the disease is less frequent than in other parts of Polynesia; 58 cases of open pulmonary tuberculosis were seen. In many instances its progress is slow and the patients do not die till relatively old. About 3 per mille have tuberculosis in some form.

Epidemics have occurred of chickenpox, whooping cough and mild influenza. Smallpox has not been seen for 40 years; the author has induced the natives to submit to vaccination. Of 308 examined for intestinal ova, 15 were found with ankylostomiasis; none had marked anaemia.

Of skin diseases, itch and pediculosis are widespread. Tokelau, common enough 20 years ago, has almost disappeared: 7 cases were seen, all at Futuna.

[Beyond stating that 8 night-bloods out of 10 contained microfilaria the author gives no figures for filarial incidence and no precise information about mosquitoes. He does not discuss the possibility that the only tertiary manifestation he describes is one of yaws rather than syphilis. He gives no indication whether the population of these South Sea islands shares in the decrease so generally described.]

VIALA's paper (*Ann. d' Hyg. et de Méd. Colon*, 1909, Vol. 12, pp. 189 and 422) is worth consulting by those interested. Viala combined the offices of administrator and medical officer. He noted the great frequency of elephantiasis and stated that he saw no other manifestation of filariasis—indeed, he doubted whether the two conditions are related at all. The second place in the nosology he gave to phagedaena, a frequent complication of the numerous wounds and ulcers. He also found claw-hand extremely common—on Wallis up to 50 per cent. had it—and discussed its relation to leprosy.]

GODAL (J.). Notes médicales recueillies au cours d'une croisière de deux ans dans le Pacifique. (Décembre 1926-Novembre 1928.) [**Medical Notes made on a Two Years' Cruise in the Pacific.**]—*Arch. Méd. et Pharm. Nav.* 1929. Oct.-Nov.-Dec. Vol. 119. No. 4. pp. 589-602. [3 refs.]

The author visited the French possessions in the Pacific and a number of those of other nations—British, Dutch, American; his notes are somewhat sketchy. New Caledonia, without malaria, is compared with the New Hebrides and scattered French groups in the Pacific. The conclusion is that the French doctors are insufficient to contend with the syphilis, tuberculosis and dysentery that are found and especially leprosy, the advance of which is serious. In the Anglo-Saxon islands there are doctors, hospitals and laboratories in all the chief centres. The hospitals are better and more comfortable than those of the French. The hygiene of Noumea, the "point noir" of the French possessions, in the South Seas, is described as "déplorable."

A. G. B.

COMMONWEALTH OF AUSTRALIA. Department of Health. **Epidemiological Record of the Austral-Pacific Zone for the Year 1928.**—36 pp With 1 folding map. Canberra.

This Epidemiological Record is based chiefly on current reports forwarded during 1928 by the health administrations within the "Zone"; 21 such administrations are listed with the respective populations. The diseases are discussed alphabetically from cerebro-spinal meningitis to yellow fever, the latter entry showing that the author does not restrict himself to diseases occurring within the zone. Some points of special interest to our readers are mentioned here.

A few cases of dengue were recorded this year at Brisbane and Thursday Island. The last epidemic in Queensland occurred in January-April, 1926, and it is noted that the secular periodicity here approximates to a five or six-year cycle. Under filariasis it is noted that in Australia there has been a steady decline in the number of cases admitted to hospital showing clinical manifestations—abscesses, lymphatic affections, etc.; the reason is obscure. Leprosy distribution throughout the zone is given in some detail, especially in Nauru Island where 132 lepers were in segregation during the year. Of malaria the findings of a survey in 1927 are quoted to the effect that in North Queensland the prevalence has declined very much and the disease is possibly disappearing. Only one case was notified from this area in 1928; and of 18 other Australian cases only 6 were indigenous—from the north-west of Western Australia. There has been no human plague in the zone since an isolated case at Sydney in 1923. The skin diseases in the tropical parts of the zone are chiefly tinea imbricata, scabies and tropical ulcer. Sprue was not reported during the year. With regard to tuberculosis it is the opinion of Dr. LAMBERT as well as that of some of the older medical officers that there is no undue amount of pulmonary tuberculosis in most Pacific groups. Both pulmonary tuberculosis and typhoid fever are declining in Australia and New Zealand.

A. G. B.

HOOTON (A.). **Medical Relief in Villages.**—*Indian Med. Gaz.* 1928. May. Vol. 63. No. 5. pp. 265–269.

The information given here is almost identical with that given by the same author in a paper noticed in this *Bulletin*, 1928, Vol. 25, p. 367.

BERTRAND (Jean). Pourquoi vieillissons-nous plus vite dans les pays chauds?—*Bruxelles-Méd.* 1929. Dec. 1 & 8. Vol. 10. Nos. 5 & 6. pp. cxlix–cli, cliv–clv; clxxxix–cxci, cxci–cxv.

BLAGOWESCHENSKY (D. I.). Das Pariser Grün als Larvizid bei der Bekämpfung der Malaria-Mücken.—*Rev. Microbiol. et Epidémiol.* 1928. Vol. 7. No. 2. German summary pp. 226–227. [In Russian pp. 156–168. With 8 figs. & 1 chart in text. 62 refs.]

FERNANDEZ (Francisco M.). The Present Status of the Practice of Medicine and Sanitation in Cuba.—*Southern Med. J.* 1930. Jan. Vol. 23. No. 1. pp. 6–8.

GASPERINI (Carlo Gasperini). Le ragioni igieniche ed economiche della nuova legislazione sulle acque nell' Isola di Rodi.—*Riv. di Malarologia.* 1929. Nov.–Dec. Vol. 8. No. 6. pp. 702–712. [English summary (5 lines) p. 748.]

JOLLY (G. G.). A Simple Rat-Trap used by the Shan Villagers of the Northern Shan States, Burma.—*Indian Med. Gaz.* 1928. June. Vol. 63. No. 6. pp. 303–304. With 2 text figs.

KOROSTELEW (W. E.). Encore sur l'effet larvicide du vert de Paris.—*Russian J. Trop. Med.* 1929. Vol. 7. No. 4. pp. 299–303. [In Russian. French summary p. 303.]

LEGER (Marcel). L'anémie tropicale idiopathique et son hémogramme.—*Arch. Mal. Coeur, Sang, Vaisseaux.* 1928. No. 7. 8 pp. [Summarized in *Bull. Inst. Pasteur.* 1929. Dec. 15. Vol. 27. No. 23. p. 1070.]

DE SÁ (L. J. Brás). Contribuição ao estudo do saneamento e assistência nas Novas Conquistas.—Oitavo Congresso Provincial da India Portuguesa. pp. 79–123. [31 refs.]

SELLA (Massimo). Gambusie e verde di Parigi nella lotta antimalarica a Rovigno (relazione per il 1928) e cenni sulla lotta in Istria.—*Riv. di Malarologia.* 1929. July–Aug. Vol. 8. No. 4. pp. 357–392. With 4 text figs. (1 map). [1 page of refs.] [English summary p. 478.]

STUART (E.) & STOVER (N. M.). Eradication of Salt Marsh Mosquitoes.—*Amer. J. Public Health.* 1927. Vol. 17. pp. 704–707.

SUAREZ (Ramon M.). "La histamina y la secrecion gastrica en algunas enfermedades tropicales."—*Bol. Asoc. Med. de Puerto Rico.* 1930. Jan. & Feb. Vol. 22. No. 175. pp. 41–45. With 1 chart. [12 refs.]

SUR (S. N.) & SARKAR (Haripada). Paris Green as an Anopheline Larvicide.—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 376–378. [4 refs.]

SUR (S. N.) & SARKAR (Haripada). Epidemic Jaundice (Weil's Disease) or Malaria in Kandi Subdivision of Murshidabad District in 1928.—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 619–620.

TRIBOUILLET (P. H.). L'assistance médicale en Indochine. Une grande oeuvre française.—*Presse Méd.* 1930. Jan. 8. Vol. 38. No. 3. pp. 43–44. With 2 text figs.

WANLESS (William J.). Medicine in India.—*Bull. New York Acad. Med.* 1930. Feb. Vol. 6. No. 2. pp. 105–131.

WERBER (E. I.). Zwalczenie widliszków w okolicach Warszawy oraz spostrzeżenia biologiczne nad anofelizmą. (Beiträge zur Naturgeschichte des Anophelismus und seine Bekämpfung mit Schweinfurtergrün.)—*Medycyna Doświadczalna i Społeczna.* Warsaw. 1928. Vol. 9. No. 3/4. pp. 237–254. With 2 text figs. [10 refs.] [German summary pp. 255–257.]

REVIEWS AND NOTICES.

KLIGLER (Israel J.) [Director, Department of Hygiene, Hebrew University, Jerusalem, formerly Director of the Malaria Research Unit, Department of Health, Palestine]. **The Epidemiology and Control of Malaria in Palestine.**—pp. xv+240. With 22 maps, 19 charts & 32 text figs. The University of Chicago Press, Chicago, Illinois. [22s. 6d.]

The study of malaria in Palestine opens up a variety of attractive lines of investigation. The climate shows great differences in temperature, rainfall and other factors between different seasons, and it is also erratic from year to year. Though the country is so small, it is extremely varied in its surface features, and it includes the bottom of the Jordan Valley, which is much more below sea level than any other area in the globe. There are rivers and swamps, springs and salt marshes; and there are barren, waterless, limestone uplands, and great downs of loess. There are people of almost every creed and every degree of civilization. There is, moreover, a more than sufficient amount of malaria, and some eight species of *Anopheles*. It may well be that in the future Palestine will come to be recognized as one of the best places for the teaching of malariology in nearly all its aspects.

Dr. Israel Kligler, the author of the book before us, has lived about eight years in Palestine, directing a Malaria Research Unit which devoted its energies in the first place to the study and control of the disease in the Jewish Agricultural Colonies, so many of which are placed, for lack of more suitable sites, in particularly unhealthy parts of the country. He and his collaborators have occupied themselves in collecting, tabulating and digesting a great range of relevant facts collected from the populations of these colonies. In the present book he has made use of this information, and also of everything that was available relating to the Gentile population. His book is a full and careful study, containing large numbers of tables and a number of good line drawings and charts; the half-tones are much less successful. If I criticize the book, it is because, as a whole, it is valuable and because the problem under consideration is profoundly stimulating. I feel that Dr. Kligler has put hardly sufficient stress on the terrible urban malaria which prevailed until ten years ago. It will be remembered that in Palestine *Anopheles bifurcatus* breeds in subterranean water, particularly in cisterns, which are innumerable in the villages and towns, beneath the very houses themselves. This insect, living so closely associated with man, produced very grave malaria in nearly all the upland towns and villages, until its control was undertaken by the Department of Health. In Palestine, perhaps more than anywhere else in the world, the strongest contrast exists between urban malaria, due to this one vector, and rural malaria, due to several species of *Anopheles*, and not differing greatly from the familiar malaria of many other countries. Then, again, one would like fuller and more precise figures with regard to the differences which have been observed year by year in the rainfall, the extent of the swamps, and the incidence of malaria in the neighbouring villages and settlements. It is a matter of general belief that a close relation exists between the amount of the annual rainfall and the epidemiology of the disease, but the point requires complete study and elucidation. The account of the population of Palestine is perhaps the least successful part of the book. It is a matter of surprise to see a distinction drawn between the "Arab" and "Bedouin." To anyone familiar with these races, the word Arab connotes first, foremost and above all things the nomadic camel owner, and that is the distinctive sense in which the word is used in the Arabic language.

Dr. Kligler's account of malaria in Palestine will be found of interest and value in all tropical countries. Practically all the sides of the subject

are dealt with, and a mass of facts is tabulated. The ordinary reader may perhaps not find it easy to discover what he wants, and may fail to realize the particular interest of Palestine to students of malaria.

P. A. Buxton.

KÄYSER (J. D.) [Lector voor Tropische Huidziekten aan het Instituut voor Tropische Ziekten, Rotterdam—Leiden]. **Voordrachten over Tropische Huidziekten. Met een hoofdstuk over Myiasis veroorzakende vliegen door Dr. P. H. van Thiel.** [Lectures on Diseases of the Skin in the Tropics.] 2de Verbeterde en vermeerderde druk.—pp. ix+494. With 66 plates & 24 figs. 1929. Weltevreden: G. Kolff & Co.

The author has been for many years lecturer on diseases of the skin at the Leiden School of Tropical Diseases and his interesting lectures are well known to all students who attended courses of instruction at that institution. The book contains a selection of his lectures and deals mainly with diseases of the skin met with in the Dutch East Indies. As such it should be of great value to medical men in the Malay Archipelago and to students of the tropical schools in Holland.

Its practical value is increased by a detailed and up-to-date discussion of the treatment of gonorrhoea in both sexes.

In an interesting chapter van Thiel gives a classification and description of flies causing myiasis.

A great number of good photographs is included in the book.

H. I. Iwow.

D'HERELLE (F.) [Professor of Bacteriology, Yale University School of Medicine]. **The Bacteriophage and its Clinical Applications.** Translated by George H. SMITH [Professor of Immunology, Yale University School of Medicine].—pp. viii+254. With 10 charts. 1930. London: Baillière, Tindall & Cox, 7 and 8, Henrietta Street, Covent Garden, W.C. 2. [18s.] [Review appears also in *Bulletin of Hygiene*.]

All who have followed medical literature in recent years know of d'Herelle's work, and those whose sphere of study has been particularly affected by his researches are familiar with his views. These are here set out in the conveniently compact form of a reprinting of the 1928 Lane Lectures at Stanford University.

J. F. C. H.

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[No. 8.

KALA AZAR.

ADLER (S.). **An Analysis of the Leishmania Sandfly Problem.**—
Trans. Roy. Soc. Trop. Med. & Hyg. 1929. Nov. 25. Vol. 23.
 No. 3. pp. 289–300. [29 refs.] [Microbiol. Inst., Hebrew Univ.,
 Jerusalem.]

Though strains of leishmania readily develop in certain species of *Phlebotomus*, variations are found in the degree to which invasion of the proboscis occurs. In certain endemic centres of oriental sore, dogs commonly contract the disease, e.g., Baghdad, while in others the canine disease is unknown, e.g., Palestine. Similarly in the Mediterranean area dogs and very young children commonly suffer from kala azar while in India the disease does not occur in dogs and is rarely if ever seen in young children. Arguing from these facts the author concludes that in localities where oriental sore and kala occur in young children and dogs, which are unable to crush sand flies on the skin, infection is caused by the bites of these insects. It is in these localities that the leishmania show a marked tendency to invade the proboscis of the flies. On the other hand, where adults alone are most usually infected the leishmania have little tendency to invade the proboscis of the fly, and infection is by crushing on the skin, resulting in inoculation of the wound or conveyance of infective material to the conjunctiva. It is evident that even if development leads to infection of the proboscis and renders transmission by bite a possibility infection might also occur by crushing. According to this view in Palestine *Leishmania tropica* has adapted itself imperfectly to *P. papatasi* and the infection is usually by crushing while in Baghdad the parasite is adapted to *P. sergenti* to a higher degree and is transmitted by the bite. In India *L. donovani* develops in *P. argentipes* and in China in *P. chinensis* and it would seem that in these countries infection by the bite may occur, but the failure to produce the disease in this way after very many attempts in experimental animals suggests that crushing may be the usual method of infection. Similarly in the Mediterranean area transmission is by the bite of sand flies.

It is noted that *L. tropica* becomes pathogenic to man after eight days in *P. papatasi* kept at a temperature of 19° C. to 23° C. and after six days in *P. sergenti* at 27° C. The intestine in the case of *P. papatasi* and *P. argentipes* is bacteriologically sterile, a fact that renders these sand flies suitable hosts of leishmania. Insects which harbour bacteria can safely be excluded as vectors. In the case of *P. papatasi* naturally

occurring infection with *L. tropica* has been found and identified by production of oriental sore in man inoculated with the flagellates. Though leptomonads have been seen in *P. sergenti* their identity with the leishmania of man has not been proved since indistinguishable infections may be produced by the leishmania of geckos. Human inoculations have not succeeded in this case. As a result of inoculation experiments, it is concluded that the leishmanias of man and dogs may be regarded not as clearly defined species but as strains which are undergoing evolution under various circumstances, for there is no simple character by which one so-called single species can be constantly differentiated from another.

C. M. Wenyon.

SHORTT (H. E.), SMITH (R. O. A.), D'SILVA (H. A. H.) & SWAMINATH (C. S.). *Leishmania donovani* in Human Faeces in Indian Kala-Azar.—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 644-646. With 1 coloured plate. [4 refs.]

A boy, 8 years of age, had been treated for kala azar in 1928 with thirty injections of sodium antimony tartrate. In August 1929 he again came up for treatment, and parasites were found by liver puncture. Dysentery of the bacillary character developed. The stools contained very scanty faecal material and much mucus and blood. Microscopically there was a heavy cellular exudate including blood cells and a scanty bacterial content. Films stained by Giemsa revealed typical leishmania on two successive days. Nearly all the slides examined showed one or more parasites, usually singly but sometimes in small groups. The coloured plate of the parasites leaves no doubt as to their nature. This is the first authentic record of the discovery of leishmania in the stools of a patient.

C. M. W.

SHORTT (H. E.), CRAIGHEAD (A. C.), SMITH (R. O. A.) & SWAMINATH (C. S.). *Phlebotomus argentipes* caught in Nature infected with *Leishmania donovani*.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 913-914. [1 ref.]

In 1926 Shortt, Barraud and Craighead recorded the natural infection with *Leishmania donovani* of a specimen of *Phlebotomus argentipes* taken in a kala azar house in Assam (this *Bulletin*, Vol. 24, p. 133). With a view to amplifying the work, flies were collected from kala azar houses at intervals during the period March 28th to August 30th, 1928. Only a few specimens are as a rule caught at any one visit. Of 226 flies dissected, 7 proved to be infected with kala azar. [It is evidently these observations which were referred to by NAPIER and which the reviewer questioned (see above, p. 91f).]

C. M. W.

SHORTT (H. E.), CRAIGHEAD (A. C.), SMITH (R. O. A.) & SWAMINATH (C. S.). Preliminary Transmission Experiments in Indian Kala-Azar not involving the Use of an Intermediate Vector.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 915-920. [4 refs.]

The uniformly negative results which have attended all experimental attempts to transmit kala azar by the bites of infected sand flies led

the authors to test other methods of transmission. ADELHEIM (1924) had already shown that a healthy mouse became infected after being kept in a jar with one which had been experimentally infected (this *Bulletin*, Vol. 22, p. 203). This experiment was repeated in a slightly modified form. Cages were wired together in pairs and in one cage of each pair was placed an infected hamster and in the other a healthy one. Six such pairs were used and each pair was placed in a large earthenware vessel which was purposely not cleaned, the cages gradually rising on the accumulating food material in the form of gram. The experiment was continued for about a year when the originally healthy animals were examined. Two examined one year and two days after the commencement of the experiment were found to be very heavily infected. In one case the originally infected hamster had died in just under three months from the beginning so that infection of the healthy animal must have occurred before this. Twenty hamsters were fed repeatedly on the deposit from the centrifuged urine of untreated cases of kala azar and twelve on gram contaminated with similar deposit but none became infected.

C. M. W.

SHORTT (H. E.), CRAIGHEAD (A. C.), SMITH (R. O. A.) & SWAMINATH (C. S.). **Third Series of Transmission Experiments in Kala-Azar with *Phlebotomus argentipes*.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 921-927. [1 ref.]

In a previous paper (this *Bulletin*, Vol. 26, p. 322) the authors describe an experiment in which an attempt to transmit kala azar to four volunteers by means of infected *Phlebotomus argentipes* failed. In the present paper a second experiment with seven volunteers and a larger number of infected flies is described. The seven volunteers had never been in a kala azar area and, as in the first experiment, precautions were taken to exclude other sources of infection. By the dissection of a certain number of flies after each feed and noting the proportion of infected individuals amongst them an estimate of the probable number of infected flies fed was made. The flies used were exclusively those having their third or subsequent feeds as it seemed unlikely that flies at an earlier stage can be infective, for it is after the second feed that the heavy infections of the anterior part of the alimentary tract occur.

As will be seen from the table the result of this second experiment was, as in the first, negative. It is pointed out that the intensity of feeding by flies was immensely greater than would ever be obtained under natural conditions. The examination of the volunteers was by liver puncture and culture of the material in N.N.N. medium. At the time of writing the paper, 18 months had elapsed from the commencement of the experiment, but it is noted that a lapse of a considerable time will be required before it can be regarded as definitely negative.

While the above experiment was in progress, it was necessary to feed the sand flies on mice when they were not required for the human experiment. In this way, six mice were bitten by probably infected sand flies to the numbers of 245, 227, 77, 37, 14, 20 respectively. The feeding extended to approximately one year in each case, but no infection resulted. It was thought that the ingestion of blood other than that of man might cause the organisms in sand flies to lose their virulence. Accordingly, an experiment was carried out in which

TABLE I.
Showing details of transmission experiments with human volunteers and *Phlebotomus argentipes*.

Volunteer.	Date of commencement of experiment.	Date of last exposure to bites of flies.	Date of examination by liver puncture.	Number of separate occasions on which bitten and largest number of flies fed on one occasion.	Total number of flies fed.	Number of flies known to be infected.	Number of flies known to be not infected.	Probable number of infected flies.	Results.
U. Moris Brenlow ...	25-1-28	28-2-29	23-4-29	54/98	1,561	77	233	397	Negative.
U. Wilan Rees ...	30-1-28	1-3-29	"	48/219	2,049	88	230	520	"
U. Niza ...	1-2-28	26-2-29	"	52/184	1,838	95	255	463	"
U. Edren ...	3-2-28	26-4-29	No examination by liver puncture.	9/95	230	17	36	58	Experiment discontinued on 26-4-28 as he was found to be suffering from pulmonary tuberculosis.
U. Muharell ...	6-2-28	21-2-29	23-4-29	48/141	1,687	72	234	429	Negative.
U. Mana ...	8-2-28	23-2-29	"	46/125	1,673	73	197	425	"
U. Sivarwell ...	1-6-28	19-2-29	"	33/104	1,259	47	191	320	Negative. Taken on in place of U. Edren, after the latter was discharged.

sand flies infected from a kala azar case were fed exclusively on human blood till their final feed on mice. Three mice were used, and the probably infected flies fed numbered 4, 4 and 6 respectively. No infection resulted.

The amount of work involved in these experiments is well illustrated by the number 273,467, which is the number of flies bred out. Of these 79,939 were fed in the laboratory. As a result of the failure to produce infection the authors remark that they can only suppose that some essential factor in the process of infection has been omitted or that a vast amount of labour has been expended during a period of five years on an insect which is not an essential link in the chain of infection. The failure of any of the subjects of experiment to show infection, while fresh infections were daily coming for diagnosis from the surrounding towns and country-side is very difficult of explanation if the theory of *Phlebotomus* transmission is to be maintained.

C. M. W.

NAPIER (L. Everard) & GUPTA (C. R. Das). **The Value of a Provocative Dose of Pentavalent Antimony in the Diagnosis of Kala-Azar.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 749-753. With 1 chart in text. [2 refs.]

CHOPRA had noted that when antimony preparations were injected into the vein in an animal there was a considerable increase in the size of the spleen, and that the normal rhythmical contractions were considerably increased. This effect was far more noticeable with the therapeutically more active pentavalent compounds than with sodium antimony tartrate. It was suggested that by this means the spleen was flushed out, and that this flushing might be a step in the curative process. Napier and SMITH in 1927 during sand fly experiments allowed the sandflies to feed immediately after an injection had been given on the assumption that the parasites in the blood would have increased in number. Later CHOPRA and Gupta (this *Bulletin*, Vol. 25, p. 423) described the appearance of parasites in the blood after injections of compounds of antimony, and considered that the drugs had a provocative action. In the present paper the authors describe a series of observations on fifty definitely diagnosed cases of kala azar. Before the administration of neostibosan parasites were found in the blood of six, the ordinary thin film being used. Five minutes after the injection parasites were found in thirteen cases and ten minutes after in twenty. After twenty and thirty minutes the positive cases had fallen to eight and nine respectively. The number of parasitized cells before was ten and after was seventeen for five minutes, and thirty-four for ten minutes. In twenty and thirty minutes the number had fallen to thirteen and fourteen. The increase is so marked that it would be worth while adopting the procedure to facilitate diagnosis when the more certain methods cannot be employed.

C. M. W.

TEDESCHI (Carlo). Un caso di leishmaniosi interna familiare in territorio di Derna. (Appunti di nosografia Cirenaica.) [**Familial Kala Azar in the Derna District, Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1930. Feb. 1. Vol. 11. No. 2. pp. 65-75. With 7 text figs. English summary (5 lines) p. 76. [Colonial Hosp., Derna.]

In 1917 PATANÈ described the first properly diagnosed case of kala azar from Tolmetta in Tripoli. During the three years 1927-1929 there

came to the author's notice 33 cases which on clinical grounds were probably cases of the disease. Four of these were in adults 23 to 35 years of age, and the others in children 20 months to 10 years of age. For various reasons the author was unable to establish the diagnosis by puncture of the spleen. Parasites were, however, discovered subsequently by RAUDO in one of the cases. Later two cases were met with at Derna and these were of interest as they were in a girl 20 months of age and her father who was about 40 years of age. Both these were diagnosed by spleen puncture. The mother, 25 to 30 years of age, was also very ill with fever and anaemia but it was only possible to take a blood film, which revealed many altered red blood corpuscles.

C. M. W.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 3. pp. 1-97. [11 Papers on Kala Azar.]

[In many cases the papers are merely preliminary notes of work which has been fully described in journals issued during the two years which have elapsed between the congress and the publication of its Transactions.]

1. **The Kala-Azar Transmission Problem and the Factor of Resistance** [KNOWLES (R.)].—pp. 1-11. [51 refs.]

Knowles discusses the kala azar transmission problem and the factor of resistance, and he suggests that the failure to transmit the disease by infected sand flies may be due to a natural resistance which must be lowered before infection will occur. In the case of human beings, the frequency with which kala azar becomes evident after typhoid fever or malaria is noted while ACTON'S experience of never seeing kala azar associated with leucoderma in which hyper-adrenia occurs may indicate that a hypo-adrenia is an essential factor. It seems possible that in endemic areas of the disease there is wholesale inoculation with the parasite, but only a small proportion of individuals develop kala azar.

2. **The Life-History of *Leishmania donovani* in its Insect and Mammalian Hosts** [SHORTT (H. E.)].—pp. 12-18.

Shortt describes the life history of *Leishmania donovani* in its insect and mammalian hosts. The details of this development have been published elsewhere.

3. **Kala-Azar Studies in North China** [YOUNG (Charles W.) & HERTIG (Marshall)].—pp. 19-23. [12 refs.]

Young and Hertig review the work they have carried out in North China, an account of which has already been published in a series of papers.

4. **The Experimental Transmission of Oriental Sore (causing Generalized Infection) in Laboratory Animals** [GUPTA (B. M. Das)].—pp. 34-35. [4 refs.]

Das Gupta described the successful infection of a guineapig and two mice with *Leishmania tropica*. The animals were killed 92 days after inoculation with cultures and all showed a visceral infection.

5. **The Action of the Pentavalent Compounds on the *Leishmania donovani* Parasites** [ACTON (H. W.) & CHOPRA (R. N.)].—pp. 36-43.

Acton and Chopra discuss the action of pentavalent antimony compounds on the parasite of kala azar. The parasites live largely in the reticulo-endothelial system of the spleen, liver and bone marrow and rarely in that of the skin. The parasites are destroyed by antimony compounds, but slowly when in the skin. This suggests that antimony is capable of stimulating the reticulo-endothelial tissues and producing substances harmful to the parasites. The bone marrow is also stimulated by the increase of leucocytes which digest the parasites which are not in endothelial cells. The rhythmic contractions of the spleen which follow administration of antimony compounds probably release parasites from heavily infected cells and permit of their destruction by leucocytes. The increased function of the adrenals caused by the injections produces marked dilatation of the vessels of the liver and spleen. This means increased permeability of the vessel wall and diminished permeability of the reticulo-endothelium, with consequent restriction of the nutrition of the parasites and their starvation. In cases resistant to antimony it is the failure of the tissues to respond in the manner indicated which prevents a cure. It is not known whether the increase in blood sugar which follows a course of treatment affects the nutrition of the parasite.

6. **The Clasmatocyte in Experimental Kala-Azar** [CASH (J. R.) & HU (C. H.)].—pp. 44-61. With 2 plates (1 coloured). [21 refs.]

Cash and Hu discuss the part played by the clasmatocyte in experimental kala azar in the hamster. By the use of certain colloidal dyes SABIN and her co-workers have concluded that the monocytic phagocytes are composed of two distinct types of cell: the clasmatocytes, which arise from specialized endothelium; and the monocytes, which arise from reticular cells widely distributed in the tissues. The large mononuclears of the blood are regarded as monocytes. The two varieties should not be grouped together. Accordingly the reticulo-endothelial system of Aschoff includes the endothelial system composed of fixed and wandering endothelial phagocytes and the reticular system composed of monocytes only. Investigation of the cells infected with leishmania has shown the authors that these are only clasmatocytes and that in these cells alone do the parasites multiply. The occasional presence of parasites in other cells is more or less accidental, as shown by their failure to reproduce. The distribution of the parasites gives support to the view that the two types of phagocytic cell are of distinctly different origin. The presence of large numbers of infected clasmatocytes in the skin of hamsters and one human case is of interest. It has frequently been seen that a small vessel is completely surrounded

by a mantle of parasitized clasmatoocytes, the nuclei of which are in a mitotic condition. This suggests that extravascular multiplication of these cells occurs.

7. **Studies upon the Peripheral Blood, Bone-Marrow and Spleen of Hamsters experimentally infected with Kala-Azar** [Hu (C. H.) & CASH (J. R.)].—pp. 62–76. With 1 chart in text & 2 figs. on 1 plate. [4 refs.]

Hu and Cash have investigated the cause of anaemia in kala azar, and have found that hamsters differ from human beings in that severe anaemia, and consequently serious impairment of health, does not occur. SABIN and her associates have shown that a close genetic relationship exists between clasmatoocytes and the red blood corpuscles which are formed intravascularly from the endothelium lining collapsed capillaries of the bone marrow. It is not surprising therefore that in a disease which affects primarily the clasmatoocytes, production of red blood corpuscles is impaired. In the hamster suffering from experimental kala azar there is a marked extra-medullary formation of red blood corpuscles, whereas in infected human beings this does not occur. No explanation is offered as to why the infection should prevent this in human beings and not in hamsters, for in other conditions there is a striking degree of extra-medullary blood formation. The observations do not explain the anaemia in human cases, but afford further evidence of the genetic relationship existing between the clasmatoocytes and the red blood corpuscles and the blood-forming potentialities of endothelium in those areas of the body where the characteristic lesions of kala azar are found.

8. **The Presence of *Leishmania donovani* in the Skin and Subcutaneous Tissue in Cases of Kala-Azar** [CASH (J. R.) & Hu (C. H.)].—pp. 77–79. [2 refs.]

Cash and Hu have already called attention to the occurrence of leishmania in the skin of human beings and hamsters suffering from kala azar (this *Bulletin*, Vol. 25, p. 71). In the present note reference is again made to these cases. It is pointed out that parasites were found in the skin of two of ten human cases examined. In one case the parasites were few in number, but in the other the infection was a heavy one. In both the parasites were present in widely separated portions of skin. The skin of one of the eight cases which were negative to microscopical examination produced infection after injection into a hamster.

9. **Erosion of the Inner Table of the Skull by Hyperplasia of Bone-Marrow in Kala-Azar, with Extra-Medullary Formation of Blood on the Surface of the Dura** [Hu (C. H.) & CASH (J. R.)].—pp. 80–86. With 8 figs. on 2 plates. [1 ref.]

Hu and Cash describe two cases in children with marked anaemia and leucopenia associated with unusually extensive and widely spread hyperplasia of the bone marrow. The first case was proved to be kala azar by the demonstration of parasites in the extra-medullary bone marrow. The second case was so similar that, though parasites were not demonstrated, there was little doubt as to the diagnosis. In both cases the hyperplasia of the bone marrow had led to erosion of the inner

table of the skull and extensive extra-medullary blood formation on the surface of the dura. Nucleated red blood corpuscles and myelocytes were not present in the blood, and their absence could only be accounted for by the assumption that such forms were unable to escape from the sites of their formation. In both cases the specific lesions of kala azar consisting of clasmotocytes were found only in the bone marrow of the skull and in that on the surface of the dura of the first case. The spleen, liver and lymph glands of both cases showed no changes characteristic of kala azar.

10. **Peripheral Lesions produced by *Leishmania donovani* and Allied Organisms** [YOUNG (Charles W.) & HERTIG (Marshall)].—pp. 87-88. [7 refs.]

Young and Hertig give an account of hamsters inoculated with *Leishmania donovani* and allied organisms. Cultures of *L. donovani* from dermal leishmanoid and the xanthoma-like lesions inoculated into hamsters intraperitoneally produced only visceral infections. Tunisian human and canine strains produced visceral infection followed by peripheral lesions. The same result followed the injection of *L. tarantolae* of the Tunisian gecko. Details of these experiments have already been published (this *Bulletin*, Vol. 25, p. 424).

11. **Diagnostic Value of the Antimony Test in Kala-Azar** [CHOPRA (R. N.), GUPTA (J. C.) & BASU (N. K.)].—pp. 89-97.

Chopra, Gupta and Basu describe the antimony test in kala azar and discuss its diagnostic value as compared with the aldehyde test (see paper by CHOPRA and DE reviewed below).

SORGE (Giuseppe). Leishmaniosi viscerale della seconda infanzia e della giovinezza. [**Kala Azar in Childhood and Adolescence.**]—*Riforma Med.* 1930. Jan. 27. Vol. 46. No. 4. pp. 129-130, 133-134. With 2 charts. [1 ref.] [Med. Clinic, Univ., Catania.]

A description of four cases of kala azar in peasants whose ages were 11, 17, 18 and 24. They were all seen during the first half of 1929 at the Clinic at Catania. Two of the cases were in a brother and sister who, living together, fell ill at the same time. Attention is drawn to the differences between the disease in adults and children, and to the greater difficulties of diagnosis and less immediate response to antimony treatment in the former.

C. M. W.

- Low (G. Carmichael). **An Interesting Case of Kala-Azar from the Point of View of Diagnosis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 305-308. With 1 chart. [Hosp. for Trop. Diseases, London.]

An Indian ship's cook fell ill on the journey to England and was admitted to hospital. There was no enlargement of the liver and spleen. The temperature remained up for a fortnight and then fell to near normal, where it remained for three weeks. The only indication was a strongly positive Wassermann reaction. A course of salvarsan injections was commenced. Two days later the temperature rose again and repeated rigors occurred. Finally liver abscess was suspected. The liver was

explored, but as no pus was discovered a smear was made. In this a scanty leishmania infection was found. Under treatment with stibamine glucoside all signs of the disease disappeared.

C. M. W.

OSTROWSKI (B.). Ueber einen Fall von Kala Azar. [**A Case of Kala Azar.**]—*Monatssch. f. Kinderheilk.* 1930. Mar. Vol. 46. No. 3. pp. 193–204. With 2 figs. & 1 curve. [10 refs.] [Children's Dept., Hadassah, Haifa.]

The paper describes in detail a case of kala azar in a boy seven years of age. The disease was contracted at Hadassa (Haifa) the case being the first to be recorded from Palestine. As treatment with antimosan did not control, the temperature neostibosan was administered with good results.

C. M. W.

YATES (Theodore M.). **Treatment of Kala Azar with Report of 92 Cases from Hope Hospital, Anhwei, China.**—*China Med. Jl.* 1929. Nov. Vol. 43. No. 11. pp. 1053–1063. With 15 figs. on 5 plates.

The paper describes the treatment of 61 cases of kala azar with tartar emetic and 31 with stibosan or neostam. In the first series the mortality rate was 23 per cent., the deaths being due to pneumonia in winter, and dysentery in summer. The average stay in hospital was 91 days. The results obtained with stibosan and neostam were much better. The mortality rate was reduced to 10 per cent. and the stay in hospital to 47 days. In the tartar emetic series the duration of the disease before treatment was commenced was 12·7 months, while that of the second series was 18·6 months. No difference was found between the efficiency of stibosan and neostam.

C. M. W.

COSTANTINO (Salvatore). Contributo alla conoscenza ed alla terapia del kala-azar. [**Treatment of Kala Azar at Palermo.**]—*Pediatrics.* 1930. Apr. 15. Vol. 38. No. 8. pp. 433–440. [Inst. of Med. Path., Univ., Palermo.]

With a view to illustrating the good results obtained in infantile kala azar by intravenous injection of tartar emetic the author describes twelve cases treated by him in Carini, Palermo. It would appear that the disease has become more prevalent in Carini during the past few years. The ages of the children varied from 14 months to 3 years. The quantity of the drug employed varied from 29 centigrams to 1·8 gm. while the duration of treatment varied from 65 days to 4 months. One patient died of broncho-pneumonia after two months' treatment, while the others were cured.

C. M. W.

BRAHMACHARI (Upendranath) & BANERJEA (Radhakrishna). **Studies in Kala-Azar and Chemotherapy of Antimony. I. Subsequent History of the First Recorded Case of Dermal Leishmanoid. II. Subsequent History of a Case of Dermal Leishmanoid originally considered to have been Refractory to Treatment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 301–304. With 2 plates. [2 refs.] [Brahmachari Research Inst. Calcutta.]

The first case of dermal leishmanoid was described by the first of the two authors of the present paper in 1922 and again in 1923. The

patient remained under treatment for some time and disappeared without being cured. A relative gave the subsequent history. The depigmented patches increased in size while the nodules ulcerated. Subsequently the nodules diminished in size and healed. The patient died of dysentery about seven years after he was first seen.

The second case referred to had been treated without result at the Calcutta School of Tropical Medicine. When seen by the authors the patient had nodules on the face, trunk and extremities and in addition was found to be suffering from kala azar with fever, large spleen and positive flagellate culture from the blood. Leishmania were present in the nodules. Under treatment with urea stibamine the visceral infection was eradicated but the cutaneous condition persisted and developed into that of the typical dermal leishmanoid. Treatment with urea stibamine was continued and 9.3 gm. was given between September 13th, 1926, and August 29th, 1927. At the end of this period the patient was completely cured. When examined eight months later there was no sign of kala azar or of the dermal leishmanoid.

C. M. W.

- i. BRAHMACHARI (Upendranath) in collaboration with GUPTA (Jnanendra Mohan Das), BANERJEA (Radhakrishna) & BASU (Barendranath). **Studies in Kala-Azar and Chemotherapy of Antimony. Part II. The Treatment of Kala-Azar with Intramuscular Injection of Sodium N-Phenylglycineamide-4-Stibinate.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 617–622. With 3 charts. [7 refs.]
- ii. — in collaboration with SEN (Parimal Bikas) & BANERJEA (Radhakrishna). **Part III. Observations on Antimony in the Spleen Cells of Animals infected with *Leishmania donovani*.**—*Ibid.* pp. 623–626. With 1 plate. [4 refs.]

i. The paper describes the use of sodium N-phenylglycineamide-4-stibinate, the antimony analogue of trypanamide, in the treatment of kala azar. Used intravenously in doses of 0.05 to 0.2 gram satisfactory results were obtained in seven cases. Five cases were treated by intramuscular injections and similarly good results were obtained. The doses varied from 0.05 to 0.15 gram in three cases, from 0.1 to 0.3 gram in one and from 0.05 to 0.1 in another. It is pointed out that local irritation is frequently slight.

ii. By injecting finely divided antimony intravenously into leishmania-infected mice the authors have noted that it is deposited in the cells which harbour the parasites. In some of the cells the antimony is in a diffuse state which probably represents a stage in the conversion of the particles into colloidal particles before they pass into complete solution. The leishmania in some of the cells containing antimony had a degenerate appearance.

C. M. W.

BUROWA (L. F.). Die Behandlung der visceralen Leishmaniose. [**Treatment of Kala Azar.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 5. pp. 309–315. [8 refs.] [In Russian. German summary p. 315.]

During the course of two and a half years, the author has seen at the malaria clinic in Tashkent 50 cases of kala azar. Of 34 cases in which

treatment with tartar emetic or stibosan was completed, 29 recovered and 5 died. In 12 resistant cases with specially large spleens Röntgen ray therapy was also employed with, in the author's opinion, good results.

C. M. W.

SCHEWTSCHENKO (F. I.). Ein Fall glücklicher Behandlung der schweren Kinderleishmaniose. [**Treatment of Severe Infantile Kala Azar.**]—*Pensée Méd. d'Usbequistane et de Turquemenistane*. Tashkent. 1929. Nov.-Dec. No. 2/3. pp. 11-15. With 3 figs. [In Russian. German summary p. 146.]

A child with kala azar was treated for two years with antimony preparations without being cured. Finally the spleen was exposed to the action of Röntgen rays while stibosan was administered. Improvement was immediate and cure resulted in six months after 80 injections of stibosan and 13 exposures to Röntgen rays had been given.

C. M. W.

PANAYOTATOU (Angélique). **Infantile Kala-azar; a Case cured at Alexandria by a New Method.**—*Brit. Jl. Children's Diseases*. 1929. Apr.-June. Vol. 26. Nos. 304-306. pp. 112-115. [4 refs.]

The case reported is that of a native boy 2½ years of age and the method of treatment was the administration of tartar emetic per rectum. The first dose was 4 cc. of a 0.25 per cent. solution of the drug and this was repeated on alternate days till five doses had been given. As there were then definite signs of improvement the dose was increased to 6 cc. and after four injections had been given the child's condition was obviously better. The dose was increased to 8 cc. and then to 10 cc. The spleen had then become almost impalpable, the fever had entirely subsided, the abdomen was soft and the venous network had disappeared. The child was bright and cheerful, the appetite was returning and the weight was increasing. The mother, who considered that a cure had been effected, did not bring the child till after twelve days had elapsed. On this occasion and seven days later 10 cc. were administered. In all 0.05 grams of tartar emetic were given in the manner indicated. Four months later the child was in good health.

This is the fourth case to be recorded from Alexandria, three others having been reported by the author in 1922 (this *Bulletin*, Vol. 20, p. 568). Attention is drawn to the fact that from the point of view of the distribution of kala azar and oriental sore Alexandria is of interest, in that both diseases occur there, though as a rule in different localities.

C. M. W.

KEEFER (Chester S.), KHAW (O. K.) & YANG (C. S.). **The Anemia of Kala-Azar, with Special Reference to Treatment.**—*Nat. Med. Jl. China*. 1929. Dec. Vol. 15. No. 6. pp. 731-742. With 5 charts in text. [3 refs.] [Peiping Union Med. College, Peking, China.]

The changes in the blood have been studied in 119 cases of kala azar. All the blood elements were reduced in the majority of patients. The characteristic changes are an anaemia of the aregeneratory type, leucopenia, and thrombocytopenia. These lead to symptoms of anaemia, predisposition to intercurrent infections and haemorrhagic

tendency. Nucleated red blood corpuscles have never been seen. In treating these patients the best form of therapy seems to be specific treatment, blood transfusion, treatment of intercurrent infections and general upbuilding with adequate diet supplemented with liver and iron.

C. M. W.

- i. CHOPRA (R. N.) & DE (N. N.). **The Significance of the Antimony Test in the Diagnosis of Kala-Azar. Part I—Serum Tests.**—*Indian Med. Gaz.* 1929. Dec. Vol. 64. No. 12. pp. 661–668. [11 refs.] [School of Trop. Med. & Hyg., Calcutta.]
- ii. NAPIER (L. Everard). **Notes on “the Significance of the Antimony Test in the Diagnosis of Kala-Azar.”**—*Ibid.* pp. 669–670. [2 refs.]

i. The authors have examined with considerable care the relative value of the aldehyde test and the antimony-test for kala azar. The aldehyde test was carried out with undiluted serum and with serum diluted 1 in 10. Of 201 cases of kala azar, which had been diagnosed by the discovery of parasites, 156 gave a strongly positive reaction with the antimony test with undiluted serum, while with the diluted serum the number was 109. The aldehyde test was strongly positive in 128 cases. In testing unknown sera for kala azar a certain number of positives are obtained from cases of other diseases if undiluted sera are used. These incorrect results are eliminated if diluted serum is used, but a number of early cases of kala azar are missed. The best result is obtained by carrying out the antimony test with both diluted and undiluted sera. It is very important that the tubes used should be scrupulously clean and that the water employed for diluting the sera and for dissolving the urea stibamine should be doubly distilled. Traces of salts may introduce errors. Small tubes with internal diameter of 4 to 5 mm. were found to be satisfactory. The serum is transferred to these tubes by means of a perfectly clean pipette, care being taken to avoid air bubbles. The precipitate with undiluted serum in strongly positive cases forms immediately, is thick and shows coarse flocculation. It conglomerates into a thick coagulated mass. With diluted serum the precipitate is smaller in amount, but has a coarsely flocculent character. The optimum time for reading the result is 5 to 10 minutes after addition of the antimony.

ii. Commenting on the results obtained by the authors of the first paper, Napier from an examination of the figures finds that the aldehyde test and the antimony test with diluted sera are of almost equal and of very considerable value in the diagnosis of kala azar, but that the antimony test with undiluted serum falls short of both of these.

C. M. W.

- NAPIER (L. Everard) & SEN (G. N.). **An Investigation to decide the Most Suitable Dilutions for the Performance of the Antimony Test for Kala-Azar.**—*Indian J. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1139–1151. [School of Trop. Med. & Hyg., Calcutta.]

In the performance of the antimony test for kala azar various dilutions of the urea stibamine solution and the serum have been employed without any very clear idea as to which are the best. With the object of determining the optimum dilutions a series of careful tests

has been carried out by the authors with the result that they find that the test was most satisfactory when a 25 per cent. dilution of the serum was added to 4, 2, 1, or 0.5 per cent. solution of urea stibamine. In practice the test can be readily carried out by adding 2 drops (0.125 cc.) of serum to 1 cc. of a 0.5 per cent. solution of urea stibamine. This method is suggested for the clinical application of the test.

C. M. W.

SHORTT (H. E.), CRAIGHEAD (A. C.), SMITH (R. O. A.), D'SILVA (H. A. H.) & DAS (Sribas). **The Diagnosis of Kala-Azar by the Urea Stibamine Test.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 907-911. [1 ref.]

The authors have investigated the reliability of the antimony test for kala azar. In 81.3 per cent. of 476 tests there was agreement with the protozoological findings. In 144 positive tests the diagnosis of kala azar would have been erroneous in 65 instances. Similarly of 314 negative tests there would have been error in 8 instances for parasites were present on these occasions. It is concluded that the test is of more value for excluding than in revealing kala azar.

C. M. W.

CHOPRA (R. N.) & MUKHERJEE (B. P.). **The Value of the Antimony Test in the Diagnosis of Kala-Azar. Part II. The Finger Prick Blood Test.**—*Indian Med. Gaz.* 1930. Apr. Vol. 65. No. 4. pp. 203-206. [4 refs.] [School of Trop. Med., Calcutta.]

In 1927 a technique for carrying out the antimony test for kala azar with blood obtained by pricking the finger was described (this *Bulletin*, Vol. 25, p. 68). The technique has been modified. A drop of blood from the pricked finger is received in a small test tube ($\frac{3}{8}$ inch internal diameter and 2 inches in length) containing 0.25 cc. of a 2 per cent. solution of potassium oxalate. The drop can easily be secured by pressing the mouth of the tube against the finger and inverting the tube. After mixing the blood with the solution the tube is allowed to stand for 10 to 15 minutes when the supernatant fluid can be pipetted off to a small tube 4 to 5 mm. in diameter and 2 inches long. A 4 per cent. solution of urea stibamine is then allowed to run along the side of the tube. In positive cases a flocculent precipitate appears slowly in the whole column of the fluid. The reading should be made in 5 to 10 minutes. In 124 definite cases of kala azar a positive reaction was obtained in 80.7 per cent. In 78 non-kala azar cases 11.5 per cent. gave a positive reading. The test is extremely simple and is a good rough test for the diagnosis of kala azar. It is a bed-side procedure in which the difficulties of vein puncture are avoided.

C. M. W.

FIorentino (Angela). Contributo allo studio dell'importanza della stibosansieroreazione nella diagnosi della leishmaniosi interna infantile. [**The Stibosan Serum Reaction in the Diagnosis of Infantile Kala Azar.**]—*Pediatrics*. 1930. Feb. 1. Vol. 38. No. 3. pp. 137-146. [12 refs.] [Inst. of Clin. Pediatrics, Univ., Catania.]

The author has tested the value of the antimony test in kala azar in 159 cases of infantile kala azar and 184 children who were either

healthy or suffering from some other disease. The tests were carried out with a freshly prepared 1 per cent. solution of stibosan. The conclusion reached is that though the reaction cannot be considered specific for kala azar a positive reaction when the symptoms are indictive of kala azar is strongly in favour of a diagnosis of this disease.

C. M. W.

CERZA (Luigi). Su di una reazione di precipitazione per la diagnosi del kala-azar. [**A Precipitation Reaction in the Diagnosis of Kala Azar.**—*Pediatrics*. 1930. Apr. 1. Vol. 38. No. 7. pp. 394–400. [6 refs.] [Inst. of Clin. Pediatrics, Univ., Naples.]

In 1924 SIA (this *Bulletin*, Vol. 22, p. 201) described a method for the quantitative estimation of the globulin precipitate which is formed when 20 cc. of kala azar blood are mixed with 0.6 cc. of distilled water. It was claimed that the reaction could be graded as strongly, moderately or weakly positive, and that the progress of a case of kala azar undergoing treatment could be followed. The present author has investigated the question in 32 children suffering from kala azar, 12 healthy children and 18 suffering from other diseases. He has found that the reaction is usually, though not invariably, positive in cases of kala azar. Its general tendency is to become less markedly positive and finally negative during the course of successful treatment. In other diseases, however, a positive reaction may occur so that for the actual diagnosis of kala azar the finding of the parasite is the only reliable method. The reaction is too irregular for the quantitative estimation of the globulin to be of value as an indication of the stage or progress of the disease.

C. M. W.

ANDRÉ (Z.) & LABERNAIE (V.). Utilisation du photomètre Vernes-Bricq-Yvon pour éviter certaines causes d'erreur dans le diagnostic du kala-azar par la réaction de précipitation de Chopra et Gupta. [**Use of a Photometer in Chopra and Gupta's Precipitation Reaction.**—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 29–30. [2 refs.] [Colonial Hosp., Pondicherry.]

In the antimony test for kala azar as described by CHOPRA and GUPTA the serum of the patient is distributed in three tubes the first of which contains undiluted serum, the second serum diluted 1 in 5 and the third serum diluted 1 in 10. To each tube are added one or two drops of a 4 per cent. solution of urea stibamine. The precipitate occurs in decreasing intensity in the three tubes, but from the point of view of diagnosis it is its presence in the third tube which is of importance. The authors note that a precipitate may occur in the third tube in the case of the serum of patients who have been treated with quinine. To obviate this difficulty they have tested the opacity of the liquids by means of a photometer and have found that changes in opacity can be detected with much higher dilutions. In the case of kala azar sera diluted to 1 in 1,000 an increase in opacity greater than 15 occurs, whereas in other conditions, as for instance in quinine treated cases, the increase is not over 5.

C. M. W.

LING (Schmorl M.). **Distribution of Protein Fractions in the Serum of Kala-Azar Patients.**—*Proc. Soc. Experim. Biol. & Med.* 1930. Jan. Vol. 27. No. 4. pp. 247–249. [6 refs.] [Peiping Union Med. College, Peking, China.]

Ray's haemolytic test for kala azar is positive when blood haemolysed with distilled water instead of remaining clear forms a flocculent precipitate. SIA and WU showed that the precipitate was due to serum globulin which is increased in kala azar. The author finds that there is an increase of euglobulin to a quantity which is three to thirteen times the normal and an increase of pseudoglobulin once to nearly twice, and sometimes more than twice, the normal. The precipitate which forms in Ray's test may be considered as due to the increase in euglobulin, or some special euglobulin.

C. M. W.

MAYER (Martin). **Neuere Ergebnisse von Kultur- und Tierversuchen mit Leishmanien.** [**Recent Cultural and Animal Experiments with Leishmania.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 94–97 (178–181). With 2 text figs.

In a previous paper (this *Bulletin*, Vol. 25, p. 859) the author with RAY stated that *Leishmania tropica*, *L. donovani* and the parasite of S. American leishmaniasis could be differentiated by the character of the growth on blood agar plates. The results were thought by some to be due to the varying age of the culture strains employed. Further observations have convinced the author that this criticism is unsound for the same differences have been noted with recently isolated strains. The European hamster is readily infected even with old cultures of *L. donovani*. The disease ends fatally in weeks or months with heavy infection of all the inner organs. As noted by CASH and HU, heavy skin infections also occur. Intracutaneous inoculation of *L. donovani* as of *L. tropica* produces a local reaction which on the abdomen takes the form of a black pigmentation. Under the epidermis parasites can be found in large numbers. The pigmentation is due to the new formation of closely packed hair follicles in the sub-cutaneous fat. Local inoculations of *L. tropica* in the ear, nose and root of the tail brought about swellings, without ulceration, in which leishmania were demonstrable after several months. A South American strain was very slightly pathogenic, but one from Palestine was very markedly so. It produced lesions in one animal not only at the site of inoculation. The eyes were involved in ulcers and oedema, the ears ulcerated and the four feet showed marked swelling. Scanty parasites were found in the spleen, liver and lungs. Another animal inoculated at the same time at the root of the tail developed an ulcer at the site of inoculation and on death revealed numerous parasites in the bone marrow and a few in the liver and lungs. Intraperitoneal inoculation of the same strain produced a generalized infection with few parasites.

C. M. W.

HOEPLI (R.). **Neuere pathologische Befunde bei experimenteller Trypanosomiasis und Leishmaniasis.** [**Pathological Findings in Experimental Leishmaniasis.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 101–112 (185–196). With 4 text figs. [7 refs.]

The author has made a histological study of European hamsters infected with *Leishmania donovani* and *L. tropica*. His results are in

complete agreement with those of MELENEY who studied infections in Chinese hamsters (this *Bulletin*, Vol. 22, p. 683). Two hamsters inoculated with *L. donovani* developed lesions of the skin at the site of inoculation. They showed small groups of macrophages occupying the spaces between the bundles of connective tissue fibres and thus differing from the lesions produced by *L. tropica* which give the impression of a new tissue rich in macrophages and capillaries which pushes aside the unchanged normal tissues. In two hamsters inoculated with *L. tropica* a generalized infection occurred and in one of these were inflammatory foci in the myocardium, where what appeared to be flagellated leptomonad forms of the parasite occurred.

C. M. W.

DE CAPUA (F.). Alterazioni del sistema reticolo-istiocitario nella leishmaniosi infantile. II. I monociti nel sangue periferico dei bambini leishmaniotici. [**Changes in the R.E. System in Infantile Kala Azar.**—*Pediatrics*. 1929. Nov. 15. Vol. 37. No. 22. pp. 1223–1234. [12 refs.] [Inst. of Clin. Pediatrics, Univ., Naples.]

Examination of the blood of forty cases of infantile kala azar revealed a constant monocytosis which varied in intensity with the duration of the disease. Eosinophiles and basophiles were very scarce, while normoblasts were not present in any numbers. In all the cases there were present endothelial cells which could be described as monocytoid endothelial cells. The percentage varied from 4.2 to 5.5. In no case were leishmania found in them. The monocytosis and particularly the presence of the cells of the endothelial type confirm the view that in kala azar there is a parasitic blocking of the reticulo-endothelial system.

C. M. W.

YANG (C. S.) & CH'EN (K. T.). **The Blood Platelets in Kala-Azar.**—*Nat. Med. J. China*. 1930. Feb. Vol. 16. No. 1. pp. 34–42. With 7 charts in text. [Union Med. College, Peking.]

The fact that one of the outstanding features of kala azar is a haemorrhagic tendency has led to an investigation of the blood platelets. It has been found that the disease is associated with a thrombocytopenia in which the platelets vary from 50,000 to 100,000 per cubic millimeter. Bleeding from the mucous membranes usually occurs when the lower level is reached. Intercurrent infections bring about either a thrombocytosis or a further depression of the platelets. Treatment with urea stibamine causes a further decrease in the number of platelets and this is maintained as long as treatment lasts. During recovery the platelets increase in number.

C. M. W.

LLOYD (R. B.), NAPIER (L. Everard) & MITRA (G. C.). **The Wassermann Reaction in Kala-Azar.**—*Indian J. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 957–959. [3 refs.]

The authors review the records of the examination of the Wassermann reaction in cases of kala azar and give their findings in a series of 474 cases of the disease. The percentage of these cases giving a positive reaction is 22, but this rate is no higher than the estimated syphilis rate of the controls. The first of the authors in 1921 examined a series of

101 cases and obtained a percentage of positives of 29, which is somewhat higher than the percentage ordinarily yielded by control series. It is concluded that kala azar is not a cause of a positive Wassermann reaction and that though syphilis may possibly predispose to kala azar infection there is actually little evidence of this.

C. M. W.

RAY (Jyotis Chandra). Serologische Untersuchungen bei Leishmanien. [**Serological Researches with Leishmania.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Nov. Vol. 33. No. 11. pp. 598-602. [12 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Immune sera were produced by inoculation of rabbits with large quantities of pure culture forms of *Leishmania donovani*, *L. tropica* and *L. tropica* var. *americana*. The sera readily agglutinated the culture forms but in most cases were not specific so that separation of the parasites was not possible. It is suggested that the magnitude of the doses given the rabbits may be responsible for this loss of specificity. An attempt at complement fixation did not give satisfactory results.

C. M. W.

MILLS (E. A.) & MACHATTIE (C.). in collaboration with CHADWICK (C. R.). **A Preliminary Note on the Relationship of the Parasites of Human and Canine Dermal Leishmaniasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Jan. 30. Vol. 23. No. 4. pp. 413-416. With 2 plates. [3 refs.]

Discussing the relationship of human and canine oriental sore in Baghdad the authors point out that there are definite areas in which the human disease is common and others in which it is rare. The canine cases are similarly common or rare in the same areas. In the British Cantonment of Alwiyah there is only one recorded human case and only one canine case, both from the same house. In Baghdad North there is a small British settlement and there two human cases and two canine cases have occurred, both in the same household at the same period of the year. Both in human beings and in dogs the early lesions begin to make their appearance in September. As the disease in dogs is of much shorter duration than in human beings the seasonal incidence of the canine oriental sore is well marked, very few cases being seen in late summer. It has been shown that *Leishmania tropica* from human cases will infect both *Phlebotomus papatasi* and *P. sergenti* and the authors have shown this to be true of the dog strain also. By growing the human and canine strains in Noguchi's leptospira medium with or without the addition of human or canine immune sera, it has been shown that they are very closely related, if not identical.

C. M. W.

CHODUKIN (N. I.). [**Fundamental Problems of the Epidemiology of Kala Azar in Relation to the Epidemiology of Canine Leishmaniasis in Middle Asia.**]—*Supplement to Pensée Méd. d'Usbequistane et de Turquemenistane.* Tashkent. 1928-29. 146 pp. With 11 plates & 16 text figs. [150 refs.] [In Russian.]

In this work an attempt is made to verify BASILE's observations in Italy regarding the correlation between human and canine leishmaniasis. The investigation was conducted in Tashkent, Turkestan, since 1925,

and was based upon an epidemiological study of the disease on the one hand, and upon the biological properties of the parasites on the other.

The incidence of kala azar in Tashkent is relatively low, the average number of cases per annum during the years 1924–1926 being 24 (0·01 per cent. of the population). The numbers of children (up to the age of 16) affected in 1926 was 28 (0·09 per cent.) out of a total of 39,369. The age incidence tends to be of the Indian type. The central part of the town is mainly affected, while in the outskirts the incidence is relatively low. In the affected districts kala azar cases are sometimes restricted to separate dwellings where they persist for a number of years.

With a view to determining the degree of contact between man and dog a census of dogs was undertaken. In 1926 the total number of dogs in Tashkent was 7,313, of which 49 (0·67 per cent.) were suffering from visceral leishmaniasis; in 1927 there were 10,724 dogs, of which 14 (0·02 per cent.) were infected. The proportion of dogs living in houses, in close contact with man, was greater in the more affected central districts of the town than in the free or slightly affected outskirts, where the majority of dogs lead an out-door existence. It was established that the central districts also represented active foci of infantile leishmaniasis. In a number of instances actual contact between kala azar cases and diseased dogs could be traced; out of 43 human cases, 33 were known to have been in contact with dogs, 16 having been in contact with known infected dogs.

In 1926 a large number of infected and healthy dogs were destroyed in Tashkent. The diminution in the number of dogs in contact with man resulted in a decrease in the number of children affected with kala azar in 1927, the number of cases being $3\frac{1}{2}$ times less than in the preceding year. In other towns in which no measures were undertaken against dogs the incidence of kala azar remained unchanged.

The author believes that leishmaniasis is spread in Tashkent through the medium of dogs. It was repeatedly observed that the appearance of infected dogs in different districts of the town was succeeded by cases of kala azar in children, but sometimes the reverse was noted. The epidemiological observations on human and canine leishmaniasis, according to the author, serve to support the contention that the causative organisms are identical.

The biological relationship of the different types of *Leishmania* was studied by means of the adhesion reaction (Rieckenberg's phenomenon), Noguchi's phenomenon and by agglutination. Eleven strains comprising *L. donovani*, *L. tropica* and the corresponding canine varieties were studied.

Using mice immunized with the four varieties of leishmania for the adhesion reaction it was found in cross tests with these flagellates that they all gave positive results, thus confirming their close affinity. In Noguchi's reaction, the serum of rabbits immunized against the organisms of canine visceral leishmaniasis had an agglomerating and parasitocidal action upon *L. donovani* and the canine variety of *L. tropica*. A group reaction was obtained by using agglutination methods with the strains mentioned. The serological reactions, according to the author, point to the identity of the receptors in *L. donovani* and *L. canis*.

The paper contains an account of successful infection of *Phlebotomus papatasi* from cases of canine leishmaniasis. The flies used were

wild females. The percentage of infected flies was up to 14.2, with an average of 2.8. The flagellates were concentrated chiefly in the anterior region of the alimentary tract. Control flies caught in the same locality as those used for the experiments were negative. Two chapters are devoted to a description of the Turkestan sand flies and their bionomics. Two new forms—*P. selectus* n. sp., and *P. grekovi* n. sp.—are recorded.

C. A. Hoare.

BOGOIAWLENSKI (N.). Leishmaniose viscérale humaine et leishmaniose des chiens dans le district de Kazakh en Azerbaidjan. [**Kala Azar of Man and Dog in the Kazakh District, Azerbaijan.**]—*Arch. Inst. Microbiol et Hyg. d'Azerbaidjan*. 1929. Vol. 1. No. 1-2. pp. 121-125. [5 refs.] [In Russian. French summary p. 155.]

In 1928 three cases of kala azar were diagnosed in the hospital at Baku. All three were from Azerbaijan. In 1929 seven cases were seen in children and two in dogs in Kazakh and one in a child in Ganja. It is evident that the human and canine disease is endemic in the district of Kazakh.

C. M. W.

SOFIEV (M. S.) & SHEVCHENKO (F. I.). **The Vitality of *Leishmania canis* in the Digestive Tract of *Phlebotomus papatasi* (Scoop).**—*Meditz. Muis' Uzbekistana*. Tashkent. 1929. Feb. Vol. 8. No. 5. pp. 48-55. With 1 plate. French summary p. 100. [Summarized in *Rev. Applied Entom.* 1929. Dec. Vol. 17. Ser. B. Pt. 12. p. 252.]

The authors have fed *Phlebotomus papatasi* on the margins of leishmanial ulcers on the nose of two dogs, one of which had a visceral infection also. The sand flies were kept for 24 hours to eight days at a temperature of 21° to 28° C. After the third day they were fed on sugar and water. The percentages containing leishmania were; first day 96, second day 69.2, third day 61.5, sixth day 2.7. On the seventh and eight days a rise in the percentage occurred, the figures being 4 and 4.05. Flagellate forms were first observed after 24 hours, the fully elongate ones on the third day.

C. M. W.

KARAMCHANDANI (P. V.). **Oriental Sore treated by Berberine Sulphate. An Analysis of Fifty Cases.**—*Lancet*. 1930. Jan. 11. p. 78. [1 ref.]

The author has treated fifty cases of oriental sore with berberine sulphate. The average period of cure was a little more than seventeen days, while the average number of injections was three. Treatment consists in injecting into the sore a solution of one third of a grain of the drug in one and a half cc. Injections are given at weekly intervals with freshly prepared solutions. It is advantageous to apply hypertonic or isotonic saline dressings. The further experience has led the author to modify the dosage recommended in an earlier paper (this *Bulletin*, Vol. 25, p. 74).

C. M. W.

MÜHLENS (P.). Ein hartnäckiger, anscheinend gegen Antimon resistenter Fall von Hautleishmaniose. [**A Refractory Case of Oriental Sore apparently Resistant to Antimony.**]—*Beshefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 79-83 (163-167). With 4 text figs.

A case of oriental sore with multiple lesions contracted in Western Asia was treated with intravenous injections of neostibosan, two injections of

neosalvarsan and local applications to the sores. As no improvement was noted injections of berberine sulphate into the lesions were instituted. During eight and a half weeks, 21 injections of a 1 per cent. solution were made into each of the larger lesions. Certain nodules which had appeared on the right forearm disappeared in three or four days as did all the other lesions except one on the left elbow and another on the back of the left hand, in which, however, leishmania could not be found when the patient was last seen.

C. M. W.

SABBAGH (Abdel-Kader). Deux cas de bouton d'Alep observés à Damas. [**Two Cases of Oriental Sore seen at Damascus.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 774-776. [Milit. Hosp., Damascus.]

A record of two cases of oriental sore in Damascus. Though the disease has been suspected there, no previous records of infection acquired in that city appear to have been made.

C. M. W.

BUSS (G.). Die amerikanische Hautleishmaniose. [**American Dermal Leishmaniasis.**]—*Arch. f. Dermat. u. Syph.* 1930. Mar. 22. Vol. 159. No. 3. pp. 555-579. With 12 text figs.

The paper gives a detailed account of the development and histology of the cutaneous, subcutaneous and lymphatic lesions of American leishmaniasis. The changes undergone by the tissues during the development of each type of lesion is traced and these bear a resemblance to the results following tuberculous or syphilitic infections. The author's remarks are illustrated by twelve microphotographs.

C. M. W.

NICOLAS (J.) & MASSIA (G.). Sur une forme lupoïde du bouton d'Orient. [**A Lupoid Form of Oriental Sore.**]—*Bull. Soc. Française Dermat. et Syph.* 1930. Jan. Vol. 37. No. 1. pp. 54-56 (R. L. pp. 32-34).

The case described was that of a man who had two nodules on the face, which were taken to be lupoid in character and one of which was accordingly excised. Histological examination showed it to be due to leishmania which were present in enormous numbers.

C. M. W.

VIGNE (Paul). Note sur le traitement du bouton d'Orient par le tréparsol et l'iodo-bismuthate de quinine. [**Treatment of Oriental Sore by Treparsol and Iodo-Bismuthate of Quinine.**]—*Bull. Soc. Française Dermat. et Syph.* 1930. Jan. Vol. 37. No. 1. pp. 50-54 (R.L. pp. 28-32). With 1 text fig.

Three cases of oriental sore were treated orally with treparsol in doses of 1 gm. on each of the first four days of the week. The drug is taken in the morning before food. One case was cured after four weeks' treatment and another in 17 days, while the third case did not respond so well. Two cases were treated with iodobismuthate of quinine administered intravenously in doses of 3 cc. twice a week. One

case was cured in $7\frac{1}{2}$ and the other in 10 weeks. The author states that he adopts this second method for the routine treatment of cases of oriental sore.

C. M. W.

MITSUSE (B.). **A Report on a Case of Kala-Azar found in Fushun.**—*Jl. Oriental Med.* 1930. Mar. Vol. 12. No. 3. [In Japanese. English summary p. 29.] [Manchuria Med. College, Mukden.]

The case reported was in a Chinese boy twelve years of age. It is of interest in being the first case to be recorded from Manchuria.

C. M. W.

MALARIA.

BARBER (M. A.). **The History of Malaria in the United States.**—*Public Health Rep.* 1929. Oct. 25. Vol. 44. No. 43. pp. 2575-2587. [13 refs.]

It is a matter of common knowledge that malaria was once highly prevalent in the northern United States, and many people now living were its victims. Undoubtedly malaria got the blame for much illness that it did not cause, but, however much it may have been burdened with the belongings of other diseases, there was undoubtedly a large bulk of it at the bottom. Taking the evidence as a whole, the fact seems to be well established that malaria, once very prevalent in the Northern States, has almost disappeared from them, and that it has diminished in the Southern States. Several factors have been suggested as contributing to this decline, and it is evident that these factors are more or less co-operative; as one rises or falls it tends to pull the others with it; when people become more prosperous they are better fed, better housed, more resistant to disease, and more able to obtain abundant quinine and screening. Again, as the country is developed prosperity increases, drainage improves with agricultural development and mosquitoes are usually reduced in numbers. As an illustration of the influence of social conditions on the prevalence of malaria, the author mentions a letter which Dr. Henry CARTER wrote to him in 1925, telling him of the great increase which occurred in Virginia after Sheridan had been through the country at the end of the Civil War, and how the disease gradually disappeared as the country resumed its former condition, but that, a few years later, there was a fall in the price of the staple crop, which was wheat, and this led to economic depression, neglect of drainage, and considerable increase of malaria. Dr. CARTER thought that the abandonment of land, leading to poor drainage, was the most important factor in causing this increase. In the northern States the prevalence of malaria in the past was closely associated with pioneer life, and it decreased with the agricultural development of the country. There can be no doubt that anopheline intensity had much to do with the prevalence of the disease, but in some districts malaria has diminished without a reduction in the number of mosquitoes. In the prosperous rice fields of Louisiana it appears that malaria, which was once prevalent, has diminished and remains low in spite of the presence of large numbers of *A. quadrimaculatus*. The author examined 136 school children in a district sixty miles north of St. Louis, where malaria was once very plentiful, but not a single positive case was found though anopheles were abundant. Rice cultivation began in this district about five years before the examination was made, and it was followed by a great increase in the number of anopheles.

"This observation shows that *A. quadrimaculatus* may be produced abundantly in a northern region, and that an increase in *Anopheles* is not immediately followed by an increase in malaria. . . . In view of the fact that *Anopheles* are still present in large numbers in regions where malaria has disappeared or greatly decreased, it appears that a decrease in *Anopheles* was not an indispensable factor generally, however effective it may have been in some other regions. It is doubtful whether screening alone could explain the rapid decrease in malaria observed in some States."

In a certain rural locality malaria has increased rapidly during the past four or five years, although the percentage of screened houses is high—over 90 per cent. . . . Quinine is a factor hard to eliminate from the malaria equation in this country. . . . Osler in speaking of malaria in the districts about the western end of Lake Ontario and the northern shores of Lake Erie, states: 'The marshes are still there and the *Anopheles* are there, but the disease has gone. As in parts of Italy, the important factor appears to have been the cinchonizing of the inhabitants.' The cheapening of the drug may have . . . hastened the disappearance of malaria. . . . The experience of troops in southern Europe during the World War, however, has shown that quinine alone cannot prevent a serious prevalence . . . "An increase in the prosperity of the rural inhabitants of a malarious region has generally led to a decrease in malaria; but . . . the economic factor may include all of the others. In every region of high endemic malaria I have visited in this country, or any other, I have always found a considerable body of rural population poorly housed and inadequately treated. . . . We have no reliable data on the possible effect of domestic animals on the disappearance of malaria in the Northern States. . . . Nor have we any definite information as regards a possible diminution in the virulence of the malaria parasites. . . . It is pertinent to ask whether the regions of the United States once malarious but now free from this disease, have become malaria proof." New human carriers have come into the northern states from several sources, but, at the most, only minor epidemics of a transitory character have resulted. In the absence of some very profound social change, it would appear that the danger is not great, even in regions where anopheles still exist in considerable numbers. In the north, the decrease in malaria seems to have come about quite independently of any conscious effort on the part of health agencies. It had nearly disappeared by the time that the method of transmission of the disease by mosquitoes was discovered. . . . *It is probable that the diminution of malaria in the south, as in the north, was due to the development of the country.* . . . The history of malaria in this and other countries indicates that the disease may greatly diminish in spite of the presence of large numbers of anopheles, especially where social conditions have materially improved.

The author concludes: "The factors concerned in the diminution of malaria in the United States are inter-dependent; their importance has varied with time and locality, but all have been closely related to the agricultural development of the country."

W. Fletcher.

JAMES (S. P.). **The Disappearance of Malaria from England.**—*Proc. Roy. Soc. Med.* 1929. Nov. Vol. 23. No. 1. pp. 71-85 (Sect. Epidem. & State Med. pp. 1-15). With 5 text figs. [9 refs.]

In the first part of this paper, Col. James deals with the history of malaria in England. The term "ague," which is so largely used in old records, meant simply *acuta* (*febris acuta*) and was applied to many diseases such as typhus, typhoid, and relapsing fevers. True malaria has always been less prevalent than has been supposed, and it is doubtful if it ever spread far from the few localities near the sea coast which are now known to be its endemic foci in this country; its distribution in 1860 was almost identical with its distribution during the last ten years. The affected areas are potentially not less malarious than they used to be, for when soldiers with malaria were invalided home to these districts, in 1916, a sharp epidemic followed with 235 cases. It is improbable that the malignant tertian parasite ever spread in England, for human infections seem to die out rapidly and Col. James has not

found it possible to transmit a strain to mosquitoes in this country. Malaria was certainly more prevalent and more severe in the past, but it is now kept in check by various factors which are continually in operation and except in circumstances such as occurred in 1916-1918, it has come to be of little importance, though the malarious character of the endemic areas has not been changed.

The second part of the paper deals with the various factors concerned with the maintenance and decline of the disease. Its decline is not due to a disappearance of *A. maculipennis*, the carrier; these anopheles are more abundant in nearly every rural district than in many exceedingly malarious places in the tropics. The occurrence of malaria in England is not correlated with abundance of anopheles; they are more numerous in some districts where it does not spread than in others where it does. The three species of English anopheles, *maculipennis*, *bifurcatus*, and *plumbeus*, can all be infected in the laboratory, but *maculipennis* is the only one which has been definitely incriminated; this is because it is the only one which lives in close association with man. It is a domestic mosquito which lives and feeds in houses and cowsheds. It likes darkness, damp, and warmth; this is why it is more plentiful in cowsheds than in human habitations, not because it prefers the blood of other animals to that of man as ROUBAUD has suggested. As infection in England occurs indoors, it is clear that the type of housing in malarious districts is all important.

Under natural conditions *maculipennis* must live at least fifteen days after feeding in order to become infective. Egg-laying ceases early in September, and there is then no reason for the mosquitoes to leave the house (See SCHÜFFNER, KORTEWEG and SWELLENGREBEL, below, p. 648). It is also in September that the malarial infection of mosquitoes caught in houses, in northern Europe, begins to rise, and it increases remarkably in October and November. Col. James has found that few mosquitoes infected in the laboratory during the egg-laying season, live long enough to become infected, but when laying has ceased, a large proportion reaches the infective stage. The temperature out of doors does not limit the development of the parasites within the mosquito to the summer months, because *maculipennis* is a domestic mosquito and development can go on in a warm room, however cold it may be outside. Though mosquito infection occurs in the autumn, human infection, in northern Europe, occurs in the spring; in the old days in England, malaria was always a phenomenon of the early months of the year. The key to this puzzle was supplied by Col. James's laboratory work which showed that in many patients who were intentionally infected with malaria by mosquito bites the disease remained latent for several months, and that the spring epidemic was due to infections transmitted by mosquito bites in the previous autumn. (See also above, p. 197). Epidemiological observations in so-called "malarious houses" show that the anopheles remain in the houses long enough to become infective and to infect the inmates. In these houses, if one member of the family happens to be a malaria carrier, cases continue to occur at intervals in that house for several weeks, but the disease does not spread to neighbouring houses. Such occurrences are limited to certain houses and certain types of people who live in them. In a cottage where a whole family sleeps in one room, malaria is likely to spread; the incidence of malaria is always higher among the poor than among those who can afford to live in better houses. If malaria were not a house disease, this would not be so universally recorded.

Col. James has found that persons can be easily immunized against a strain of benign tertian, and this has happened in several isolated villages ; but the resistance is not proof against another strain, and the rise of malaria in endemic centres is generally due to the importation of new cases of the disease carrying new strains of the parasite. At present the disease is maintained chiefly by imported cases, but there is also an indigenous strain which has never entirely disappeared. When the imported cases are quickly discovered and treated with quinine the disease soon becomes negligible. The Kent epidemic of 1917 assumed large proportions because it was not diagnosed correctly, but as soon as it was recognized to be malaria it was very quickly stopped by quinine treatment. The introduction of cheap quinine was probably one of the most important factors in causing the observed reduction in the fatality and incidence of malaria in England.

Col. James concludes that the diminution of local malaria in England was due neither to natural causes nor to the intentional application of any particular preventive method reputed to be specific, but to progressive improvements of a social, economic, educational, medical and public health character. *A. maculipennis* is parasitic on man in proportion as human habits and mode of life are primitive and like those of the indigenous inhabitants of undeveloped countries where all the members of a family live huddled together in a cave, or in a windowless hut made of mud or straw. In England, particularly during the last seventy years, there have been great changes for the better in social and economic respects. Houses are better lighted and ventilated ; they are more open and less crowded and are much less liable to harbour anopheles. Other advantages accompany social and economic improvements ; roads are made ; scattered houses become easy of access ; doctors are available ; the people are not so indifferent to the advantages of health and comfort as more backward populations are ; they take pains to get proper medical attention and treatment with quinine. Malaria persists in England only in a few isolated rural areas which are notoriously backward in the common amenities of modern civilized life. In these localities wages are low, a whole family may live in one room of a dilapidated wooden shack, and no doctor is available for eight or ten miles. Proceeding from west to east across Europe this correlation between malaria and a low standard of living becomes very plain. " Malaria, like tuberculosis and syphilis, is a social disease."

Col. James adds : "*In order to prevent misunderstanding, I should like to add that my paper is not concerned at all with plans for dealing with malaria among particular groups of people who live in places or under conditions where accepted standards of living, and the medical and sanitary arrangements, make it practicable and desirable to supplement existing work by a direct attack aimed either at the insect host and carrier or at the parasite in man.*" Although this kind of work is of great local importance it has little to do with the problem among the bulk of the population of malarious countries, the poor, illiterate, underfed, indigenous peasantry whose dwellings are little better than those of primitive man. Among such people, malaria cannot be dealt with as an isolated problem; economic improvement is the object to which attention must first be directed. Agricultural schemes which aim primarily at improving the economic prosperity of the people, and are known as " bonifications," are of immense benefit to the indigenous population so that they become settled and well to do, and able and willing to assist in actively combating malaria and other diseases. The sources of malaria are not eradicated

by these schemes, but the people live in better houses, they are better fed, they are within reach of medical aid, and after a time the disease ceases to be of great importance as a cause of sickness and death.

W. F.

CILENTO (R. W.) & BALDWIN (A. H.). **Malaria in Australia.**—*Med. Jl. Australia.* 1930. Mar. 1. 17th Year. Vol. 1. No. 9. pp. 274–282. With 1 map in text. [43 refs. & bibliography.]

Malaria in Australia is, to-day, confined to a small area in the north-west, to two areas in the Northern Territory, and to two areas in north Queensland. In all these places, with the exception of the town of Cairns on the coast of Queensland, the infection is almost entirely limited to cattle-men, miners, sugar-cane labourers and aborigines. These are men who often live and work under very primitive conditions, with poor food and lodging. To the north and north-west of Australia, in the New Guinea archipelago and the great Melanesian arch is one of the most malarious regions in the world; north of 20° south latitude and west of 150° east longitude every area up to the equator is heavily infected with the exception of Australia. In the town of Cairns, endemic malaria probably depends on intercourse between infected natives from the islands and the population which lives in the overcrowded, swampy, and dirty native quarter of the town. Up to 1880, malaria was occasionally introduced into the country, but it failed to establish itself except around the Gulf of Carpentaria. The sparsity of the population is largely responsible for this fortunate freedom. During the period 1880 to 1890 there were temporary concentrations of population in connexion with mining, and malaria reached its height so far as its history in Australia is concerned. A similar increase of the disease has followed the discovery of payable minerals in subsequent years; the miners are attracted from malarious districts, living conditions are bad, and malaria spreads. A considerable change for the better occurred between 1891 and 1900, and it continued during the next decade when the Kanaka labour was repatriated; mining had become more stabilized and living conditions were better. During the last ten years, the deaths number only about 5 per million, and of 9,022 people examined in Western Australia, the Northern Territory, and south Queensland, only 44 had parasites in their blood. The distribution of *Anopheles annulipes* is general throughout the country and there have been large influxes of infected persons. Why is it, then, that malaria has become established in only a few small areas, and why does it not flourish even in these? It is true that, in Australia, there is no suitable native population to act as a reservoir, and the aborigines have little contact with the Europeans; the population, too, is very scanty in the malarious area, but on several occasions malaria has spread where sanitation was poor and work was heavy. The authors find the answer in the high standard of living enjoyed by most workers in the tropical and sub-tropical districts; they conclude that "the all-important factor is the economic and hygienic status of the people," which they believe will "safeguard Australia from a menace which has crippled many another country."

W. F.

WATSON (Malcolm). **Twenty-Five Years of Malaria Control in the Malay Peninsula—1901-1926. Malaya's Pioneer Work: the Development of "Species Sanitation," Subsoil Drainage, and Non-Poisonous Oiling: America Studies Malayan Methods: the Future of Biological Control: Some Malayan Pioneers.**—*Jl. Trop. Med. & Hyg.* 1929. Dec. 2. Vol. 32. No. 23. pp. 337-340.

Ronald Ross's discovery was at first looked upon as valueless though interesting. "The honour of being the first country in the Empire, and perhaps in the world, to use it successfully belongs to the Government of the Federated Malay States. Malaria control by drainage was begun in 1901, and before long the towns of Klang and Port Swettenham were completely freed from the disease." Though the swampy coastal districts were easily dealt with, great difficulties were encountered in the hills where malaria was carried by anopheles which bred in fast-running streams. After a temporary check, these difficulties were overcome by subsoil drainage, by oiling with a mixture of crude oil and kerosene, and by the preservation of jungle in ravines. The secret of success was "species sanitation," or the policy of striking only at the dangerous species of anopheles. "Then as a river restrained rises and bursts its barriers, our advance swept on with ever-increasing width and power. From hundreds of square miles in Malaya malaria has been driven; tens of thousands of lives have been saved; an incalculable amount of sickness, poverty and misery averted." The author expresses his surprise that, in view of the well-known successes achieved in Havana and Panama, the southern states of the U.S.A. were twenty years behind the Federated Malay States in beginning mosquito control.

W. F.

WALKER (J. H. C.). **Anti-Malaria Measures in Malaya.**—*Jl. Roy. Army Med. Corps.* 1930. Feb. Vol. 54. No. 2. pp. 87-106. With 14 text figs. [5 refs.]

The first part of this paper deals with the history of malaria in the Malay States and Singapore, and is largely compiled from WATSON'S "Prevention of Malaria in the Federated Malay States." [Major Walker is not quite correct in stating that the European area of Kuala Lumpur was freed from malaria in 1913 and has remained so ever since. Occasional outbreaks in the places which were highly malarious before they were drained show that the disease has been scotched but not killed, and are a reminder that constant watchfulness is necessary.] Figures are given showing that malaria, which was always present before the war among the troops stationed in the Singapore barracks, has been banished by anti-malaria drainage. There have been no cases since 1925. The author points out that "species sanitation" is the key-note of anti-malaria measures in Malaya, and that, as WATSON has shown, the three carriers of the country, *A. ludlowi*, *A. umbrosus* and *A. maculatus*, occur in three more or less distinct zones, in each of which a different method of control is required. (1) *A. ludlowi* breeds in the mangrove swamps; in the virgin state *A. umbrosus* is found in this zone, but if for any reason the jungle is cleared *A. ludlowi* makes its appearance. The most satisfactory measures are clearing and felling, or completely shutting out the sea by means of bunds, with open drains and sluice-gates. (2) *A. umbrosus* flourishes in the jungle of the coastal

plains, and is dealt with by clearing and putting in clean earth-drains, or by removing the cooly-lines at least half-a-mile from the jungle. After clearing, ravines are drained with sub-soil drains to prevent invasion by *A. maculatus*. (3) *A. maculatus* is the carrier of the central, hilly, inland zone, where it flourishes in clean, running water to which sunlight has access ; even the smallest seepage may be responsible for outbreaks of malaria. It does not breed in streams shaded by jungle, and it is now a well-recognised rule not to disturb the jungle unless anti-malaria measures can be undertaken. This mosquito is dealt with by controlling all surface water in sub-soil drains or concrete surface channels. Diagrams and photographs are given showing the kinds of drains and drainage employed in different parts of the country. There is also a photograph of a herring-bone system of concrete drains at Lymeun Fort in Hong Kong, which is given as an example of the futility and danger of attempting anti-malaria drainage without proper knowledge. These drains held back the surface water and *A. maculatus* was found breeding all over the drained area and in the drains themselves.

W. F.

JAMES (S. P.). **Report on a Visit to Kenya and Uganda to advise on Antimalarial Measures.**—48 pp. 1929. Crown Agents for the Colonies, 4, Millbank, London, S.W. [Is.]

Col. James spent the greater part of his visit to Kenya working in two or three selected areas with the Director of the laboratory, Dr. KAUNTZE, and the Senior Entomologist, Mr. SIMES. Field observation stations were established at Kitale and Taveta. This course appeared more useful to him than a hurried survey of wider extent, and it provided an example of the kind of work which was needed in the country. The conditions : (1) in towns ; (2) on railways and public works ; (3) on the farms of European settlers ; and (4) among the scattered indigenous population, are so different that they were studied separately.

(1) *Towns.* As regards the towns, Col. James agrees with the policy of freeing them from malaria by operations of drainage, filling, and other methods designed to prevent the breeding of anopheles, and an expert anti-malarial engineer, Mr. H. BENNETT, has been seconded from the Malay States for work in Nairobi, Kitale and Eldoret. There are many difficulties to be overcome ; the site of Nairobi was badly chosen, its streets were badly planned, its sanitation is a menace, its population includes nearly 30,000 Africans and Asiatics who live under appalling conditions, and there is no machinery for the collection of vital statistics. Col. James considers that something more than major drainage schemes is required, and he recommends the appointment of a medical officer under the Municipality who would devote his whole time and attention to enquiring into the source of new cases of malaria, and to perfecting the details of anti-larval and other anti-mosquito measures adequately supported by anti-mosquito legislation. It is suggested that malaria should be made a notifiable disease, and that blood-films should be examined without charge at the government laboratory. Col. James is convinced that in the towns of Kenya malaria is a household disease in which the native servants, housed on the premises, are the usual source of infection, and that it could be dealt with most successfully by the householders themselves, acting under the advice of the malaria officer.

(2) *Public Works.* With reference to the railways, Col. James considers that the proposals made by their medical officer, Dr. K. WALLINGTON, would do much to improve them. He recommends that the railway authorities should themselves build hotels, at important junctions, which can be properly protected against mosquitoes and that, in the smaller places, the waiting rooms should be carefully screened.

(3) *Farms.* The prevention of malaria on the farms of settlers is considered to be a matter for the settler himself, aided by medical advice. The "Malaria Survey of Kenya," to which reference is made later, should draw up a definite plan for each farm and make periodical inspections. "The siting of houses for Europeans is, of course, by far the most important matter to be considered in connexion with the prevention of malaria among them." The houses of the settlers are generally built near streams, where the cattle and labourers tread down the banks and make a swamp in which mosquitoes breed. The stream should be trained and regularized, its banks kept smooth, and the formation of swamps prevented. If mosquitoes continued to breed freely in spite of these precautions, Paris green or oil should be used. The house-boys, with their wives and children, should not live nearer than 200 yards; the kitchen should be inside the house where it can be inspected frequently. Farm labour should be housed not less than 400 yards away, and no squatters should be permitted within half a mile. It is as important to prevent mosquitoes conveying the infection from the native labourers as it is to prevent mosquitoes breeding. The curative treatment of house-boys and labourers with quinine promises to be an important aid in preventing the spread of malaria. "Next to site and surroundings," says Col. James, "the type of house is most important." He recommends a wide verandah all round the house so that it can be effectively screened with 14 mesh No. 30 Imperial Standard wire gauze. In order that the house should afford as little shelter as possible to mosquitoes, ceilings should be provided for all rooms, and the walls should be colour-washed a light colour; every bed should have a rectangular mosquito net hung inside the framework. Until a properly screened house is available, a new settler should not be accompanied by his wife and children. It is important that the farms selected for receiving pupils should be in healthy districts.

(4) *The Indigenous population.* Malaria among the scattered natives is an entirely different problem. *In towns, on public works and on farms, "present knowledge enables and requires us to deal with the disease and its insect carrier by direct measures;"* but this only concerns some hundred thousand of the population of Kenya, and leaves untouched the problem of malaria prevention among the 2½ million naked, semi-nomadic, natives, who are almost without the necessities of life and are distributed over 200,000 square miles of country. The index of endemicity among them is very high and they constitute the source of malaria which spreads to the non-immune Europeans and Asiatics. It is not practicable to apply the expensive and difficult direct anti-mosquito measures, which are suitable for towns, to the vast area over which the indigenous peasantry is scattered. "Among them malaria cannot be dealt with satisfactorily as a matter separate from other medical and public health problems." The low economic status of the people must be raised. They themselves are more concerned about their material prosperity than about their health and it appears unreasonable to expect them to make better sanitary arrangements when they have only the bare necessities of life. Col. James did not think that the contention

that if they would take the initiative by doing what was advised about their health, they would become stronger and able to work harder and be able to earn more money struck them as an attractive appeal. It seems that the best way to gain their interest and co-operation is by a scheme which will increase their material possessions as well as their health, and that a plan is needed which will enable them to develop their lands and improve their standard of living—bonification, in short. Col. James suggests that a definite agricultural scheme should be drawn up for them in one of the reserves ; and that it should include a system of irrigation, by which a large area of land will be made to yield a profitable return. Lack of water is the fundamental difficulty in the reserves. When the natives become settled and prosperous, they will be able and willing, he thinks, to assist in actively combating malaria, tuberculosis, syphilis, and other social diseases. "The sources of malaria are not eradicated by these schemes, but as people live in better houses, have more and better food, and are within easy reach of medical aid, they are not infected so frequently, and the disease, when it occurs, is quickly and effectively treated and overcome."

He recommends the setting up of a new organization, The Malaria Survey of Kenya, consisting of a group of special workers to study malaria in all its aspects. It would comprise : two medical officers ; one medical entomologist ; one anti-malarial engineer ; one European laboratory assistant ; one entomological assistant, and an adequate number of African subordinates. The medical officers would have a year's training in the malaria laboratories of either the Ministry of Health in England or of the Tropical Diseases Institute at Amsterdam, and at the Central Bureau and Field Observation Stations of the Malaria Survey of India. If they had not taken the D.P.H., they should also undergo a course of training at the London School of Hygiene. Col. James also proposes the inauguration of an East African Research Fund (analogous to the Indian Research Fund), to which he suggests that the Governments of Kenya, Uganda, and Tanganyika should contribute.

Uganda.—Col. James made two tours in Uganda. All the places which he visited in the eastern provinces were so malarious that the disease among the indigenous inhabitants was chiefly a disease of children under five years of age ; most of those who were older than this had acquired immunity. He visited Kampala with Mr. H. BENNETT, the expert anti-malaria engineer from Malaya. The town is built on a series of hills, with swampy gullies between them in which there are brickfields, native vegetable gardens, wells, and borrow-pits. The incidence of malaria is very high ; its carriers are *A. costalis* and *A. funestus*, and a large proportion of those caught in tents were found to be infected (zygote infection 10 per cent. ; sporozoite infection 4·3 per cent.). The total area of the gullies is about 500 acres, and Mr. Bennett estimated the cost of their subsoil drainage at £15,000, with an annual charge of £600 for maintenance. Both he and Col. James recommend that, instead of putting in these drains, the gullies should be planted with eucalyptus trees ; the Forest Department has already dealt with a swamp near Kampala in this way and the results have been excellent. The cost would be only about a sixth of the cost of subsoil drainage, there would be no charge for upkeep after the first five years, and, later on, the plantations would bring in revenue. Col. James suggests that the value of afforestation with eucalyptus should be one of the subjects of enquiry for a local malaria survey unit. He recommends

that this organization should consist of a medical malaria officer, a medical entomologist and assistants, who should, later on, form the nucleus of a "Central Malaria Survey Unit." This would constitute a malaria section of the research laboratory Entebbe, where it would investigate the epidemiology of malaria in Uganda as a whole.

W. F.

WATSON (Malcolm); GILL (C. A.); ROSS (R.); CLARKE (Tertius); KING (W. G.); WHITE (R. Senior). **Antimalaria Measures.** [Correspondence.]—*Brit. Med. J.* 1930. Feb. 8. pp. 259–260; Apr. 12. p. 718; Apr. 26. p. 797; May 3. p. 840; May 17. pp. 928–929; May 17. p. 929.

Sir Malcolm Watson attacks Col. JAMES's theories of malaria prevention, as interpreted in the *British Medical Journal's* review of his recent report on Kenya and Uganda. Sir Malcolm Watson states that 29 years' experience of malaria in the tropics has led him "to conclusions directly opposite to those of Col. James," and that the effects of diet, housing, economic status, and general sanitation are practically negligible. He taunts Col. JAMES and his followers with having accomplished nothing by the methods which they advocate; "should we not ask the 'modern school,' " he writes, "where have you attempted to control malaria, and what have been the results? When that question has been answered, we will know the value of their advice, in a matter of vital interest to the Empire." As an example of what has been accomplished by antilarval measures, Sir Malcolm instances their efficacy in protecting the labourers engaged on certain public works in Singapore, and he states that the application of such methods has enabled malaria to be controlled in ever-widening areas in Malaya, and has saved tens of thousands of lives and an incalculable amount of money in Singapore.

[A summary of Col. JAMES's report appears on page 631 of this number of the *Bulletin*. In this report Col. JAMES recommends that drainage and other direct methods of attacking the mosquito, similar to those adopted in Malaya, should be employed in towns and estates; but he argues that such methods cannot be applied to a semi-nomadic indigenous peasantry, numbering $2\frac{1}{2}$ million people scattered over an area of 200,000 square miles. Malaria has been successfully controlled in many towns and estates in Malaya; but, taking the country as a whole, malaria heads the list of diseases as the chief cause of sickness and death. The following paragraph occurs in the last annual report of the Principal Medical Officer of the Federated Malay States. "In the report by the Chief Health Officer will be found tables showing the number of deaths due to malaria throughout the country annually for the last ten years, and the annual death-rate from malaria for the four states and the four large towns over a period of seven years. Study of these tables reveals little progress in the mastery of the disease during this period."]]

Colonel Gill writes with reference to Sir Malcolm WATSON's letter, above, deploring the baneful influence of this difference of outlook upon the prosecution of anti-malaria measures, and "the fact that the old school of malariologists have endeavoured to establish their viewpoint by means of unsubstantiated claims regarding their successes, and by their declamations, mainly in the lay press, against the stupidity and

ignorance of those who presume to differ from them." The lay administrator, writes Colonel Gill, is deterred from sanctioning expenditure on malaria research because, according to the old school, this is unnecessary; he is likewise deterred from attempting to combat malaria in places where men, money, and material are not available for anti-larva measures, because he has been told by the same "high authority" that the only way to control malaria is to destroy all mosquitoes. Colonel Gill concludes that "one of the chief apostles of malaria control has unwittingly become one of the chief obstacles to progress in a matter of vital importance to the health and welfare of the Empire."

Sir Ronald Ross writes that mosquito control is similar to the measures undertaken by agriculturalists to protect their crops against the pests which attack them. These measures always cost money, but the agriculturalist finds it is worth his while to employ them; malaria, too, costs money and it is worth while preventing it. Sir Ronald doubts if there is a cheaper method of control. "There is only one school of competent malariologists—those who do the work."

The letters of Dr. Tertius CLARKE, Col. W. G. KING and Mr. R. Senior WHITE, also contribute to this discussion.

W. F.

KNOWLES (R.). **An Account of a Brief Tour with the Malaria Commission of the League of Nations.**—*Indian Med. Gaz.* 1930. Jan. Vol. 65. No. 1. pp. 30–34. With 3 text figs.

The Commission has spent five months in India, and has visited the most intensely malarious parts. Col. Knowles who accompanied its members during their three days' tour of the Singhbhum District, along the Bengal-Nagpur Railways, states that they were greatly impressed by the method of diagnosis by blood-culture which is employed at the Calcutta School of Tropical Medicine as a routine measure in malaria. The tour took the party through the water-logged tract of Santiagachi where there are many better-class Bengali houses lying deserted; this is attributed partly to a tendency to migrate to the city of Calcutta, partly to malaria, and partly to kala azar. They passed through country where the control of malaria would be too expensive to make it worth while, until they came to Messrs. Tata's iron mines at Noamundi, where the disease was formerly prevalent. Control was begun here in 1929, after a preliminary survey by Sir Malcolm WATSON and Mr. SENIOR-WHITE. The river, which was the chief source of malaria, has been trained, subsoil drains have been put in, pools along the river have been oiled, and the houses have been screened. Here the ideal has been realized of a malaria-free enclave within a malaria-ridden district. "Noamundi mine is now entirely free from both larval and adult anophelines, and the only cases of malaria which occur are relapses." Outside the protected area there is free anopheline breeding, and an intense malaria incidence. "It was obvious that such principles are only applicable by some of the wealthiest commercial concerns in India;" but at Dangoaposi, the junction through which all the ore from the mines passes, very little money was available, and yet much has been accomplished by filling swamps and borrow-pits, and by regular oiling. "Dangoaposi Station presents a malaria control almost as

perfect as that at Noamundi Mines, but at absolutely minimum cost. The moral of Dangoaposi Station is, we believe, applicable to vast tracks of India, especially to big commercial concerns." At a malarious place named Uluburu the Commission visited a lake which has formed in a disused manganese quarry. It is notable because, for some reason unsolved by chemical analysis, "its water is absolutely inhibitory to the breeding of mosquito larvae; they simply cannot live in it." Mr. SENIOR-WHITE, the malariologist of the railway, told the Commission that he had found that control within a radius of half a mile was effective. He had great difficulty with *A. culicifacies* which "if limited, can take refuge in the usual breeding sites of *A. rossi*." Professors SCHÜFFNER and SWELLENGREBEL concluded, from the results of spleen examinations, that malaria in the most intensely hyper-endemic areas of India could not compare with conditions in the Dutch East Indies. Further, Professor SWELLENGREBEL considered that control within a half-mile radius was quite inadequate.

W. F.

BANERJEA (A. C.). **Some Observations on an Unusual Epidemic of Malaria in the City of Lucknow (April-September 1929).**—*Indian Med. Gaz.* 1930. Mar. Vol. 65. No. 3. pp. 149-153.

Lucknow has a population of some 200,000 and it is interesting to note in comparison with the statistics of European cities that, in 1928, the death rate was 46 and the birth rate 52. There are no records of an epidemic of malaria having occurred in the city. The spleen rate was 3.1 in 1913; since then antimalarious schemes have been in progress and in 1923 the rate had fallen to 1.4. The breeding grounds of mosquitoes are the banks of the river on which the town is situated, tanks, lakes, casual collections of water and wells, and stagnant pools in the bed of an old, dried-up, water-course. In January, 1929, double the usual numbers of fever patients were admitted to the city hospitals, and, from April onwards, there were four or five times as many. Two-thirds of the cases were benign tertian infections. The wells were found to be breeding large numbers of *A. stephensi*, and seven out of 75 mosquitoes were found to be infected, five of them with sporozoites. The disease was most prevalent in the heart of the town where there was the largest number of wells.

W. F.

BASU (B. C.). **The *Anopheles stephensi* Problem in Calcutta.**—*Indian Med. Gaz.* 1930. Apr. Vol. 65. No. 4. pp. 185-191. With 4 text figs. [21 refs.]

There is very little malaria in Calcutta; the Health Officer of the Corporation reported that the death-rate from malaria, for the six years 1922 to 1927, varied from 1.1 to 1.6 per mille. Some years ago, Col. S. P. JAMES examined 140 children without finding any with enlarged spleens. The main breeding places of *Anopheles stephensi* within the

city are receptacles in which water is stored—cisterns, barrels, tubs, and jars. The obvious remedy is a continuous, high-pressure, water supply which will render the storage of water unnecessary.

W. F.

RAMSAY (G. C.). **Assam's Malaria Problems and their Solution.**—*Lancet*. 1929. Dec. 28. pp. 1356–1358. [1 ref.]

— **The Factors which determine the Varying Degrees of Malarial Incidence in Assam Tea Estates and the Fundamental Principles governing Mosquito Control of Malaria in Assam.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 511–518. [6 refs.] [Labac Central Hosp., Dewan P.O., Cachar, Assam.]

Anopheles minimus is almost entirely responsible for the malaria of Assam. In the dry cold season it is prevalent in the low-lying, flat land, where it breeds in clear water at the edges of slow-running streams and pools. When the monsoon breaks, the streams become rapid and muddy, and the clear pools become covered with algae. These monsoon conditions are uncongenial to *A. minimus*, and it therefore migrates for the summer to higher and safer levels where it breeds in slow-running drains and in seepages and tanks. When the migration is retarded by drought, there is an increase of malaria on low-lying land; on the contrary, when migration is hastened by early rains, there are early epidemics of malaria in the high land. The period of infectivity of *A. minimus*, in nature, is from the middle of April until the end of the year. The efficient control of malaria is dependent on measures directed against the summer breeding grounds. Flooding and flushing by the rains account for the greater healthiness of the low-lying tea estates and rice fields. The clearing of jungle in the hills is followed by outbreaks of malaria. The author considers that the planting of Cassia, or a kind of privet known as *Duranta*, in order to shade the streams and drains may prevent the breeding of *A. minimus*. He proposes to deal with swamps and seepages by drainage, or possibly by planting thick vegetation such as Tarapat (see this *Bulletin*, Vol 26, p. 909); but in view of the fact that MACGREGOR found *A. funestus* (which is almost, if not altogether, identical with *A. minimus*) breeding in shaded streams and rivers in Mauritius, he does not intend to advocate any type of shade until further knowledge has been gained.

W. F.

SPEEDY (W. D.) & ADHIKARI (A. K.). **A Record of Malarial Cases in the Bengal-Nagpur Railway Construction Hospital Titlagarh from July 1928 to August 1929, with Some Observations on Mosquito Findings and Conditions of Transmission.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 629–631.

The malaria season in this district begins about a month after the commencement of the rains, and it goes on until December though *A. culicifacies*, the carrier, stops breeding three months earlier. This fact is interesting in view of SWELLENGREBEL's theory of "gonotrophic dissociation." (See above, p. 196.)

W. F.

GRAHAM (J. D.). **Collected Memoranda on the Subject of Malaria.** Reprinted from **Government of India Reports (1847-1924).**—*Records of the Malaria Survey of India.* 1930. Mar. Vol. 1. No. 2. pp. vi+203. With 4 plans (3 folding), 1 folding diagram & 9 charts (6 coloured & 2 folding). Calcutta: Thacker, Spink & Co. [Rs. 12-8 or 16s. 8d.]

This consists of reprints of certain memoranda of particular historic and scientific value, included in Government papers during the last eighty years. One of the most interesting is the report of a Committee consisting of two engineers and Surgeon T. E. DEMPSTER, which was appointed in 1845 to enquire into the causes of unhealthiness along the course of irrigation canals. The task of this Committee appeared, at first, to be hopeless because no trustworthy statistics were available, but the difficulty was overcome by the ingenuity of Surgeon DEMPSTER. It occurred to him that "the inhabitants of unhealthy districts in India often carry in their own persons a record of past suffering, which can at all times be easily read, and which no one can either falsify or suppress, this is enlargement of the spleen." He suggested "that the condition of the spleen in any number of individuals would be a fair test of the probable frequency and degree in which they had suffered from malarious influences." At each place, twenty children and twenty adults were selected for examination; DEMPSTER considered children to be the more delicate test of malaria. He drew attention to the importance of examining the spleens of the inhabitants before selecting a site for an encampment. "However healthy a locality may appear in other respects," he wrote, "if its native inhabitants are generally afflicted with organic disease of the spleen, there beyond all doubt does much malaria exist, and there also will European and native troops suffer." The Committee found then, as many similar committees of enquiry have found since, that much malaria is man-made. The disease was generally, though not universally, more prevalent in the districts irrigated by the canals, and they reported that by far the greater part of the evils which they observed was not the necessary and unavoidable result of canal irrigation, but was due to obstruction of the national drainage of the country. Their recommendations might have been drawn up to-day:

"We feel doubtful whether any suggestion proceeding from authority, as to mode of life, exposure, food, clothing and construction of houses, would be adopted and voluntarily practised by the agricultural population. The best and most efficient prophylactics of this class, naturally come with competence and ease, but much might be done to improve the salubrity of village sites, viz.: to stop irrigation within two hundred yards round all canal villages . . . to deepen all good village tanks, and to keep them full of water all the year round—to drain all shallow pools in or about villages, or to convert them into proper reservoirs of water—and, wherever it may be possible, to improve the drainage of village sites."

In a report written in 1909, Col. J. W. T. LESLIE criticized the statement, which is so commonly made, that five million persons die annually in India from malaria. He pointed out that the mortality returned in most parts of the country under the heading "fever" included many diseases in addition to malaria, and that special enquiries and dispensary returns indicated that only about one-fourth of the deaths was due to malaria. He found that the death rate from malaria among the prisoners in the gaol was only one-fifth of that among the general population, and from this he argued that nearly three-fourths of the fever deaths among

the people could be prevented if they could be placed under favourable hygienic conditions, given prophylactic doses of quinine and provided with skilled medical attendance. In connexion with these recommendations it is interesting to read the departmental reports (1920) on the free distribution of quinine and its sale below market price, which are printed on page 196. These reports make it fairly clear that, on the whole, it was a failure. In the Punjab, for instance, the poor did not buy the quinine and it was suspected that a good deal was purchased by Indian druggists; in Burmah, large quantities fell into the hands of speculators who created an organization for selling at greatly enhanced prices; in Bihar and Orissa, quacks and chemists bought it in large quantities for compounding their medicines; from Delhi, it was reported that "the real objection to such distribution is the inevitable waste, as the remedy is rarely absorbed under right conditions, or in proper quantities."

On page 149, the conclusions reached at a meeting of Sir E. MACLAGAN, Sir Pardy LUKIS, Lieut.-Colonel CLEMESHA and Major Norman WHITE, held in January 1916, are set out. With reference to quinine they concluded that "very little can be expected from the prophylactic issue of quinine in a free, uneducated population under no sort of discipline or control." They agreed that malaria was on the increase in parts of Bengal which were formally subject to annual inundation from the rivers of the Delta, but were now protected from flooding by embankments. In the absence of inundation, the land had become impoverished and the consequent poverty of the inhabitants was an important factor in the prevalence of the disease; depopulation, a marked feature of the worst areas, was attributable both to malaria and to impoverishment of the soil. Those areas in Lower Bengal still subject to inundation were relatively little affected with malaria.

On page 163, there is an important report by Lieut. Col. CLEMESHA, written in 1917, on the influence of railway construction on malaria.

"I do not think that it can be denied," he writes, "that owing to deficient sanitary arrangements, or other causes, during the aggregation of labour for construction work, epidemics of malaria and other diseases have occurred, and very large tracts of country have been rendered extremely unhealthy . . . and the blocking of drainage with embankments sometimes occasions the ill-health of the rural population. . . . Before the railway was constructed, Ennur was one of the health resorts of Madras. Since the construction of the railway bridge over the backwater, the place has been practically uninhabitable on account of the prevalence of malaria. . . . We are probably still suffering in Bengal from the direct results of an epidemic which was primarily started by the construction of the line between Calcutta and Burdwan in the 'fifties.'"

On page 137, is a report, made in 1912, by the Secretary to the Government of the United Provinces, Sanitation Department, with regard to "millions," in which it is stated that "the conclusion on the whole subject seems to be therefore that 'millions' are incapable of withstanding the climatic conditions of this country in the hotter tracts, and that they are not markedly superior to indigenous varieties of fish as larvae destroyers."

Many other important reports are republished, but it is impossible here to do more than mention two of them; for example, one written by Sir Leonard ROGERS in 1917 on the forecasting of malaria epidemics; and another, by Col. R. D. MURRAY on the great epidemic in the United Provinces during 1908, when 1,141,079 persons died of malaria.

W. F.

- WALCH (E. W.) & SCHUURMAN (C. J.). **Saltwater Fishponds and Malaria.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 3. pp. 341-366. With 14 figs. & 1 plan on 8 plates. [9 refs.] [Med. Lab., Weltevreden.]
- & —. *Zoutwatervischvijvers en malaria.*—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. Mar. 1. Vol. 70. No. 3. pp. 209-234. With 9 figs. & 1 plan on 6 plates. [8 refs.] [Med. Lab., Weltevreden.]

This paper is an instructive example of the value of making a thorough scientific enquiry before embarking upon an extensive sanitary engineering scheme. The salt water fish-ponds of Java cover an area of about 140,000 acres and give a yearly profit to the population of about seven million florins. The fish, or *bandeng* (*Chanos chanos*), breed in the sea; their fry is caught along the coast and transferred to the shallow artificial ponds, where they feed on algae. The algae of these ponds are of two kinds: green, floating, surface-algae (*Enteromorpha*, *Chaetomorpha*, etc.), and a brownish mass of blue bottom-algae (*Cyanophyceae*, diatoms, etc.) which the natives call water-dung. The surface-algae form a network, in the meshes of which *Anopheles ludlowi* breed in great number, secure from the attacks of their mortal enemy, *Haplochilus panchax*—the little "tin-headed" fish of the Javanese. The fish-ponds are responsible for so much malaria, that it was proposed that they should be abolished by filling them up or by breaking down their banks and letting in the sea. Either of these methods would be tremendously expensive and would destroy a profitable native industry; moreover, the less costly method of letting in the sea often fails to destroy the algae and the anopheles. In the district of Pasoeran, in East Java, the authors found fish-ponds free from surface-algae and the population free from malaria. The natives in this district have adopted the custom of laying dry their fish-ponds once a month. The sun reduces the green surface-algae to dust, but it does not destroy the bottom-algae or water-dung. When the water is let in again, the bottom-algae form bluish or blackish green masses, and large flakes rise and float on the surface, like pieces of cow-dung. They are compact masses, which anopheles larvae cannot enter, and they are quickly devoured by the bandeng. It appears that the fish can be reared as successfully on this water-dung as on the green surface-algae, and the authors believe that it will be possible to render the fish-ponds harmless by the adoption, in other districts, of the Pasoeran system of emptying the ponds once a month, without injuring the fish-breeding industry.

W. F.

- MANALANG (C.). **Malaria Studies.**—*Jl. Philippine Islands Med. Assoc.* 1929. Dec. Vol. 9. No. 12. pp. 437-439.

The author bewails the inaccuracy of statistical returns of malaria. The provincial malaria mortality returns showed 26,000 deaths from malaria in 1926, 19,000 in 1927, and 13,000 in 1928. The author does not attribute this 50 per cent. reduction to preventive or curative methods, but to better diagnosis. Only 10 to 15 per cent. of supposed malaria deaths could be confirmed by post-mortem examination. In one district where none of the children had enlarged spleens the record showed 12,000 deaths from malaria; in another

province where 90 per cent. of the children had enlarged spleens, and the parasite rate was 85 per cent., there was no record of a death from malaria for two years. "Appraisalment of the amount and ravages of malaria should be based only on a careful scientific survey in competent hands, and not on a compilation of data carelessly or unscientifically collected." The carrier in the Philippines is *A. funestus minimus*, which breeds in streams and sometimes in irrigation ditches, but not in swamps, pools, or artificial containers. It is not attracted by cattle; precipitin tests showed that 80 per cent. contained human blood. It has a range of 1.5 kilometres.

W. F.

MORIN (Henry G. S.). Considérations sur l'enquête malariologique en Cochinchine : son but, sa technique, les services qu'on peut en attendre. [**The Malaria Survey in Cochin China : its Object, its Technique, and the Service that can be expected from it.**]—*Bull. Soc. Méd. Chirurg. Indochine*. 1929. Aug.-Sept. Vol. 7. Nos. 8-9. pp. 436-454. With 3 charts in text. [Pasteur Inst., Saigon.]

This is a general outline of the principles and methods of a malaria survey, with classical examples of the results of control in Panama, the Malay States and elsewhere. The author's experience in Cochin China that *A. maculatus* is rarely caught in houses is the same as that of investigators in Malaya. He caught 472 adult mosquitoes in 58 houses; 176 were *A. minimus* and only 3 were *A. maculatus*.

W. F.

D'ANFREVILLE DE LA SALLE (L.). La lutte contre le paludisme à Casablanca en 1929 [**The Antimalaria Campaign at Casablanca in 1929.**]—*Presse Méd.* 1930. Jan. 1. Vol. 38. No. 1. pp. 11-12. With 1 text fig.

——. Un moyen de lutter contre le paludisme au Maroc. [**A Method of dealing with Malaria in Morocco.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 53-58.

The abundant rains of 1927 and 1928 converted the low-lying parts of Casablanca, the racecourse and open spaces into swamps which did not dry up in the summer. In all, some 20 acres within the Municipal area were turned into marsh. The tribesmen who flocked to the city supplied the source of infection; there was a severe epidemic, and the total number of deaths from all causes in 1928 was 1,766 higher than in the previous year (total population 130,000). The disease began in an aviation camp near a permanent swamp on the outskirts of the town, and gradually spread towards the centre. It failed, however, to reach the Jewish quarter away from the marshes, in spite of its grievous sanitary condition. The recommendations of the M.O.H. were: (1) to straighten the streams; (2) to drain or fill the permanent marshes to a distance of 1 km. beyond town limits; (3) to deal with the large collections of water which cannot be got rid of, either by oiling or by larvivoracious fish. Quinine was supplied to school children. Gambusia and Cyprins were put into some of the marshes. The anopheles season begins in April, but the marshes were not drained until July; at the latter date the streams were straightened and the swamps connected with them were abolished. The year 1929 was

exceptionally healthy in Casablanca, and the Bureau of Hygiene attributed the improvement to the draining of the breeding places, but 1929 was not a fever year in most regions of Morocco. W. F.

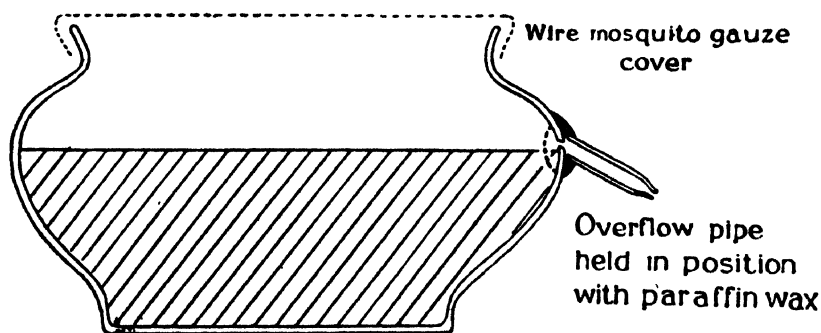
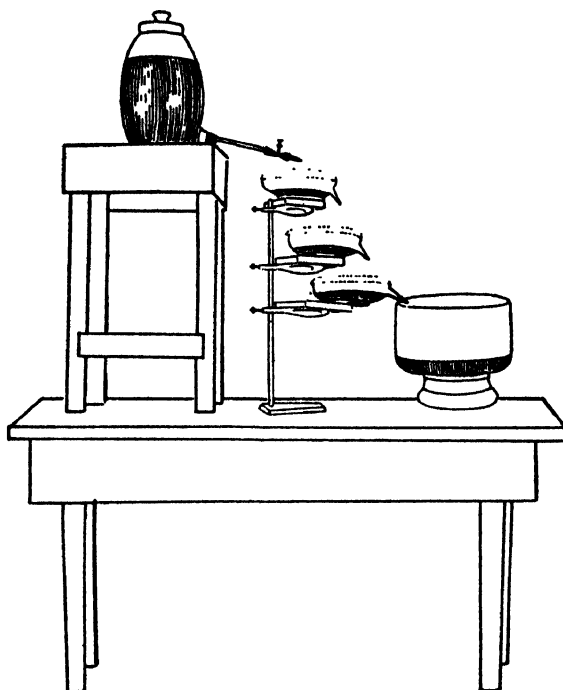
ANDERSON (T. Farnworth). **Report on an Investigation of Health Conditions on Farms in the Trans-Nzoia, with Special Reference to Malaria.**—*Kenya & East African Med. Jl.* 1930. Jan. Vol. 6. No. 10. pp. 274–308. With 7 charts. [1 ref.]

Dr. Anderson has tried to find a practicable method by which settlers may reduce the incidence of endemic malaria among the members of their labour forces by means of quinine. He points out that such a method can only be regarded as a temporary measure to prevent the infection of anopheles whilst steps are being taken to reduce their numbers. With this object in view, he administered a single dose of quinine, once a week, to a number of labourers and their children. The dose was 15 grains of the bisulphate in solution for those over 10 years of age, 10 grains for those between 5 and 10 years, 5 grains for those under 5 years. The quinine was administered personally by Dr. Anderson. Blood films were examined at the beginning of the experiment, and at the end of the fifth, ninth, and thirteenth weeks. In the first experiment, with about 75 persons under treatment and 40 controls, the general May–June rise in the parasite-rate took place only in the controls. At the end of the thirteenth week, parasites were found in 54 per cent. of the controls and 31 per cent. of the quinine group; the gametocyte-rate was 19 per cent. in the controls and 7 per cent. in the quinine group. The numbers were small, and only about two-thirds of the subjects were available for examination on all four occasions. In a second experiment, Dr. Anderson treated the whole of a labour force in order to avoid infection from untreated controls. The labourers and their children, a group of 116 persons, were treated weekly for four weeks, with the result that the parasite-rate was reduced from 44 to 8 per cent.

Dr. Anderson has visited a large number of the farms in the Trans-Nzoia District, where malaria is the most important disease in all communities, and where there was a severe epidemic in 1928. The common types are subtertian and quartan; benign tertian is rare. Malaria is most prevalent in May, at the time of the greatest rainfall, and blackwater fever occurs about two months later. The native children are the main reservoirs of infection; the spleen-rate, the parasite-rate, and the gametocyte-rate are all at their maximum in children under 6 years of age. The gametocyte-rate in children between 1 and 7 years is 25 per cent.; after 10 years of age it is less than 2 per cent. and such a degree of immunity is established that, in spite of the high spleen and parasite rates, pyrexial attacks are uncommon, and the average haemoglobin index is as high as 87 per cent. Malaria in Trans-Nzoia is a man-made disease. The untouched streams are heavily shaded by trees and thick bush; *A. costalis*, the carrier, which prefers open water exposed to sunlight, will not breed in them, but a prolific breeding-ground is made when the vegetation is removed and the water is dammed up to make a drinking place or washing pool for the labourers and cattle of the farms. The borrow-pits on many farms, formed in the course of brick-making and building, are another source of mosquitoes; a third breeding-place is the unmetalled road full of ruts, of which there are hundreds of miles in the district. W. F.

GORDON (R. M.) & MACDONALD (G.). **The Transmission of Malaria in Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1930. Apr. 7. Vol. 24. No. 1. pp. 69–80. With 1 text fig. [27 refs.] [Sir Alfred Lewis Jones Research Lab., Freetown, Sierra Leone.]

The common anopheles in Sierra Leone are *A. funestus*, *A. gambiae*, *A. rhodesiensis*, and *A. mauritanus*. *A. gambiae* is essentially a house-



Modification of Boyd's Drip Apparatus used for the rearing of anopheline larvae. The upper reservoir, containing a dilute emulsion of yeast in water, discharges into a series of gauze protected jars in which larvae are placed; the alkalinity of the water in these breeding jars is conserved by adding a small quantity of calcium carbonate. The glass dishes are of the type used for the exhibition of confectionery in shop windows. The hole for the overflow pipe is drilled with a diamond and covered with a fine gauze screen to prevent young larvae being washed away.

[Reproduced from *Anna's of Tropical Medicine and Parasitology*.]

haunting mosquito and is usually far in excess of other species, though it is absent at certain seasons. It feeds voraciously on man, both by day and night. The average natural infection rate of adults caught in houses is 7.1 per cent. The authors found 2 out of 21 infected. Three mosquitoes, out of 21 which they fed on crescent cases, became infected in the salivary glands. They conclude that *A. gambiae* is the most important transmitter in the country. It was found possible, but not easy, to infect *A. rhodesiensis*, and this fact combined with the rarity of the species in houses led the authors to conclude that it was not an important carrier in Sierra Leone. Experiments were also carried out with *A. smithii*, an anopheline which is found only in the neighbourhood of Mount Aureol, near Freetown. No naturally infected specimens were caught; it did not bite readily, but 2, out of 6 which fed, became infected. The authors consider that it plays a small, but very local, part in the transmission of malaria. Only laboratory-bred mosquitoes were used for the experiments, and a modification of Boyd's drip apparatus was employed [see figure, p. 643].

W. F.

SCHWETZ (J.) & BAUMANN (H.). **Study of the Malaria Index in Young Natives of School Age in the Settlement of Stanleyville (Congo Belge).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 279–288. [1 ref.]

Stanleyville is a settlement of about 300 Europeans, situated on both banks of the Congo, a little to the north of the equator and at the foot of the Stanley Falls. Mosquitoes are uniformly prevalent and malaria persists with equal intensity, year in, year out. A vast native population, in numerous villages and compounds, encircles the European settlement. *A. gambiae* (*A. costalis*) far outnumbers all the other species of anopheles put together, and is very common in native huts. The sporozoite index of this mosquito was found to be 11.5 per cent., and the index of 1,469 anopheles of various species was 9.25. The authors examined 952 apparently healthy children and adolescents, from 5 to 20 years of age, in the schools of Stanleyville, with the result that they found parasites in the blood of 85.5 per cent. and enlarged spleens in 84.7 per cent. A thick drop and a thin film were examined in each case. The authors consider that the true infection rate was about 100 per cent. They found that the proportion of persons with small numbers of parasites, and only moderately enlarged spleens, diminished very slowly as the age increased; extreme splenomegaly was found almost exclusively in infants. Subtertian infections were the rule, but quartan parasites were present in nearly one-fourth of the cases. *P. vivax* was not found. Gametocytes were found in 34.7 per cent. "It is needless to insist on the danger of this immense reservoir of virus." (See this *Bulletin*, Vol. 26, p. 939).

W. F.

LEGENDRE (F. M. A.). Note sur le fonctionnement du service antipaludique à Madagascar. [**A Note on the Working of the Antimalaria Department in Madagascar.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 1016–1028 and 1930. Jan. 8. Vol. 23. No. 1. pp. 122–132. With 1 text fig.

The antimalaria service of Madagascar was reorganized in 1927, and the author has been in charge since the end of that year. The possibility of growing cinchona in the island is under investigation, but it will be

several years before the results of this attempt are known, and the shallow soil overlying an impermeable bed of laterite makes success doubtful. The Spanish method of staining blood films is employed: 3 drops of blood are stirred up with a needle on a slide until they are defibrinated. After drying, the film is stained with a solution of Giemsa ($1\frac{1}{2}$ drops of Giemsa to each 1 cc. of distilled water) for a quarter of an hour; the stain is then poured off, without washing, and a solution of Leishman's stain, of the same strength, is poured on. At the end of a quarter of an hour, the slide is lightly washed in ordinary water, dried, and examined. The spleen rate, at Antananarivo, is 77.6 per cent., including spleens enlarged but impalpable. The parasite index varies from about 10 to 20 per cent. *P. vivax* is more common in the dry, cold season; *P. falciparum* is more common in the damp, hot weather; *P. malariae* does not occur in Madagascar.

Antananarivo, the capital, is surrounded by rice-fields, some of which extend into the town itself. The cultivation of rice within a certain radius has been forbidden by law, but unfortunately no provision was made for drainage, and the fallow land has become a veritable nursery for *A. costalis*, the carrier. Funds are not plentiful and Dr. Legendre has a difficult task before him; in many places, owing to the lie of the land, costly engineering works are necessary before drainage can be effected. Minor works have been carried out, and "stoxal" and Paris green have been used. *Gambusia* have been imported, but, before they are distributed, observations are being made to determine whether there is any danger of their destroying the eggs of the edible fish of the country, as the "millions" appear to have done in the island of Mauritius. The population is very ignorant, and they are repeatedly led astray by rumours of the ill effects of treatment and blood testing. The local doctors are moreover insufficiently trained to examine blood films; diagnosis is faulty and much quinine is wasted.

W. F.

REICHENOW (Eduard). Zur Frage der Malariaresistenz bei Negeren. [**Malarial Resistance in Negroes.**]—*Beihfte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 58-64 (142-148). With 1 text fig. [3 refs.]

Observations were made on 176 Haussa negroes in a village near Carnot in Cameroon during the war. The author sets forth his results in a table. The ages were from under five years up to over 40 years. The blood was examined for parasites and the temperature was taken. He considers that resistance to parasites is not present to any extent in children, but increases with age and reaches its highest point when the body is fully developed; after that it does not increase. Judged by temperature observations the Haussa negroes have a high degree of resistance to the malarial toxin, which is observed even in quite small children. He considers therefore that toxin resistance is inherited, but not parasite resistance.

E. D. W. Greig.

PELLER (Sigismund). Die Malaria und deren Bekämpfung in Palästina. [**Anti-Malarial Measures in Palestine.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Mar. 28. Vol. 116. No. 2/3. pp. 132-160. With 4 charts in text. [10 refs.]

The author sums up the post-war position in Palestine as follows: (1) Systematic antimalarial measures in Palestine are confined to

therapy, antilarval measures and clearing the ground. (2) The fall in malarial morbidity in the first years of antilarval control was not due to this measure. It did not prevent the malarial position from becoming much worse in the years 1926, 1927 and 1929. The morbidity amongst the Jewish emigrants varies within wide limits, from 0 to 100 per cent. (3) The percentage of the total malarial cases due to quartan and malignant tertian infection is markedly reduced. The benign tertian infection reaches its peak in autumn. The relapse frequency is reduced. These changes are independent of the prophylactic measures which were carried out. Of great importance in connexion with malaria is the probability of relapse and the duration of the period of freedom from attack; this applies equally to the primary infection and to the relapse. (4) The view that children show a greater malarial morbidity than adults is not in accordance with the experience of the Jewish emigrant families of Palestine.

E. D. W. Greig.

REITLER (Rudolf). Ueber die Rolle der Imaginesbekämpfung in der Malariaverhütung. [**The Role of Anti-Mosquito (Adults) Measures in the Protection from Malaria.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Apr. Vol. 34. No. 4. pp. 198–210. With 4 text figs. [1 ref.]

The author was in charge of anti-malarial work for the Palestine Electric Corporation during the construction of the Jordan Power Scheme. The species of anopheles were, *A. elutus*, which breeds exclusively in still water, and *A. superpictus* and *A. sergenti*, which breed in slow running water. *A. elutus* and *A. superpictus* have two peaks of reproduction, one in the beginning of summer and the other in autumn; *A. sergenti* has only one such peak at the beginning of autumn. In winter reproduction is almost at a standstill and in the middle of summer it is diminished. The author concludes that measures against the imagines are of great importance for protection from malaria.

E. D. W. Greig.

- i. MAKARJIN (A. A.). Malariamückenbekämpfung im früheren ostlichen Buchara (Tadshikistan) in den Jahren 1924–1927. [**Anti-Mosquito Measures in Tajikistan, formerly Eastern Bukhara.**—In "Die tierischen Parasiten und einige parasitäre Krankheiten des Menschen in Tadshikistan" [PAWLOWSKY (E. N.), Edit.]. Leningrad. 1929. pp. 13–25. With 2 plates. [In Russian. German summary pp. 25–27.]
- ii. MASSAITIS (I. I.). Malariabekämpfung in der Stadt Kuljab (Tadshikistan). [**Anti-Malarial Measures in the Town of Kuljab (Tajikistan).**—*Ibid.* pp. 28–39. With 3 text figs. [In Russian. German summary p. 40.]
- iii. LATYSCHEW (N. I.). Zur Biologie der Mücke *Anopheles superpictus* Grassi. [**Biology of *Anopheles superpictus* Grassi in Tajikistan.**—*Ibid.* pp. 41–58. With 2 figs. & 3 plates. [In Russian. German summary pp. 58–59.]

i. Malaria in this Republic causes great damage: thus in the course of 11 months from October, 1926 to September, 1927, 3,660 workers were rendered unfit for work with a loss of 29,700 working days; during this period, 157,250 roubles were disbursed as sick relief, and 70 per cent. of this sum was received by malarial patients. Various anti-malarial measures have been undertaken actively since 1927; e.g., rice cultivation has been

forbidden within 3 kilometers of inhabited places, drains cleared, river margin trimmed and the beds deepened. In 1928 a station for malarial investigation was started at Dushambe.

ii. Anti-malarial measures similar to the above were carried out in the town of Kuljab with the result that, from 1925 to 1927 the number [not stated in summary] of malarial cases in the local garrison diminished; the endemic index fell from 64.6 to 7.4; the index of Ross from 2.30 to 1.07; the parasite index from 34 to 3.7; and the spleen index from 60 to 3.7.

iii. *Anopheles superpictus* is found chiefly in the plains and low foot hills of Turkestan, but it has been got up to 1,500 metres. It enters human dwellings readily, but is not found on domestic animals. Both adults and larvae hibernate in winter. As a vector of malaria it plays the most important rôle. Paraffin and paris green are recommended for antilarval measures. The other species are *A. bifurcatus*, *A. pulcherrimus*, *A. claviger*, *A. elutus*.

E. D. W. Greig.

RUCHADSE (N.). Haustiere und Malaria. [**Domestic Animals and Malaria.**—*Nachrichten der tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 9-10. [In Georgian script. German summary pp. 704-705.]

An example is given of a village in Georgia where one-half of the inhabitants (Armenians and Greeks) stable their domestic animals, and the other half (Georgians and Abkhassians) do not. In this village the Armenians and Greeks showed: Spleen index, 24.7, Ross's index, 1.8, parasitic index, 11.2, endemic index, 29.2: on the other hand the Georgians and Abkhassians of the village showed: spleen index, 51.6, Ross's index, 3.2 parasitic index, 14.6, endemic index, 56.

E. D. W. Grieg.

DE BUCK (A.), SCHOUTE (E.) & SWELLENGREBEL (N. H.) Zur Kenntnis des Anophelismus ohne Malaria in dem Küstengebiet der Niederlande. [**Anophelism sine Malaria in the Coastal Area of the Netherlands.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 619-631. With 2 maps & 1 fig. in text. [13 refs.] [Inst. for Trop. Hyg., Amsterdam.]

The authors have extended their previous investigations (see this *Bulletin*, Vol. 26, p. 915). They conclude that the essential cause of anophelism sine malaria is the tendency of the transmitting mosquito species to split into local forms. The authors find two forms of *Anopheles maculipennis* in the Netherlands, a short and a long winged variety; the former, which does not hibernate, is especially characteristic of malarious regions. Very slight biological variations convert the *Anopheles maculipennis* of the Netherlands into a porter; thus the mere continuation of feeding on blood after the cessation of the reproductive activity, has as a consequence the autumnal spread of malaria. As regards the morphological distinctions of the mosquito which can be correlated with the biological ones and useful indicators of the existence of the latter, nothing can be laid down; and it would be a mistake [which the authors themselves made] to expect the findings in one country to apply to another.

E. D. W. Greig.

KORTEWEG (P. C.). Die epidemiologische Bedeutung der Neuinfektionen mit Malaria tertiana im Herbst. [**Epidemiological Significance of Fresh Infections with Benign Tertian Malaria in Autumn.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1929. Dec. 14. Vol. 110. No. 4. pp. 724-731. With 3 text figs. [7 refs.] [Inst. for Trop. Hyg., Amsterdam.]

The material at the disposal of the author for this study consisted of about 2,000 cases of malaria observed in the course of his practice in the village of Wormerveer, Holland, between 1902 and 1918; for subsequent years he is indebted to his successor. He noted that *primary* attacks of malaria were much commoner in the spring and summer than in autumn. As a result of his observations he reaches the following conclusion: That almost without exception, a high percentage of malarial cases after September 1st forecasts an increase, and a low percentage a decrease of malaria in the following year.

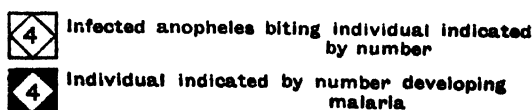
E. D. W. Greig.

SCHÜFFNER (W. A. P.), KORTEWEG (P. C.) & SWELLENGREBEL (N. H.). **Experimental Malaria with Protracted Incubation.**—Reprinted from *Proc. Roy. Acad. Amsterdam.* 1929. Vol. 32. No. 7. pp. 903-911. With 1 text fig. [17 refs.] [Inst. of Trop. Hyg., Amsterdam.]

—, — & —. Proefondervindelijke malaria, met lange latentie. *Nederl. Tijdschr. v. Geneesk.* 1929. Oct. 5. 73rd Year. 2nd Half. No. 40. pp. 4622-4629. With 1 text fig. [17 refs.] [Roy. Colonial Inst., Amsterdam.]

It had been maintained on clinical grounds by Korteweg that the malaria appearing in the early part of the year before June 1st, that is to say, before the first summer generation of mosquitoes had emerged, could only be explained by an infection contracted in the previous autumn. This thesis received support from Swellengrebel's observation that malarial infection of anopheles is practically confined to autumn and winter and that it is almost absent during the height of malarial attack incidence. In 1927 JAMES had four patients bitten by infected mosquitoes in November, December and February, all of whom were under observation and only contracted their first malarial attack 6 to 9 months later. Korteweg's experience with his experimental malaria seems at first sight to be a contradiction of his own thesis, as four out of the five patients bitten by his mosquitoes developed malaria in the ordinary incubation time of 10 to 20 days, but then these mosquitoes were heavily infected and the patients were subjected frequently to their bites. The main experiment in support of the contention of a long latency for malaria appearing in the earlier half of the year was carried out on six persons, all volunteers. Four of them were only bitten once and two of them twice, by mosquitoes the degree of whose infectivity was estimated by subsequent dissection. Each of these test individuals had his temperature regularly taken for three weeks after being bitten and had his blood frequently examined. This procedure was continued at occasional intervals thereafter. No indication of parasitic infection was demonstrable in any of them before the actual attack made its appearance, unless the finding in one case of a single pigmented leucocyte can be regarded as such.

All these test persons, who had been bitten between October 30th and November 7th, developed a malarial attack for the first time between June 26th and August 2nd of the following year, that is, some eight months after being bitten. The authors had hoped that their small artificial epidemic would have reached its height in May or June instead of in July. JAMES's patients, however, who were infected in November and December, did not develop their malaria until later



I-III James's experiments
1-6 Our own experiments

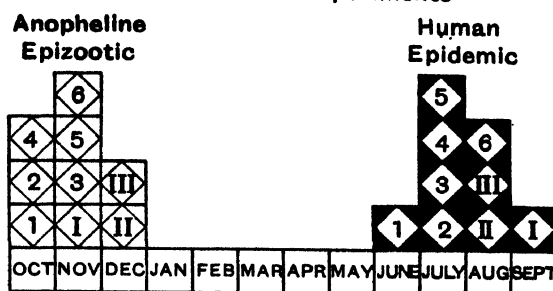


Diagram representing the combined results of JAMES's and the authors' malaria transmission experiments, to illustrate the possibility of a summer epidemic of human malaria arising from an autumnal epizootic of anopheline infection.

[Reproduced from *Proceedings of the Royal Academy at Amsterdam.*]

still. They consider it probable that if the epidemic were to be brought off in June, it would be necessary to have the mosquito infection at the end of September or beginning of October. Their tests indicate that a mosquito with autumnal infection by human malaria can give rise to malaria not only before but also after the June 1st of the next year.

W. F. Harvey.

OTTOLENGHI (D.) & BROTZU (G.). Sulla sopravvivenza del virus malarico negli anofeli ibernanti. [**On the Survival of the Malarial Virus in Hibernating Anopheles.**—Reprinted from *Bull. Scienze Mediche*. 1929. May-June. Year 101. Ser. 10. Vol. 3. 4 pp. With 1 chart. [8 refs.] [Hyg. Inst., Univ., Bologna.]

Malarial outbreaks in the spring have been attributed to anopheles biting patients uncured and still harbouring the plasmodium, or to the parasite having reached an early stage in development and remaining dormant in the mosquito during the winter and completing its development when the temperature again becomes favourable. Colonel JAMES has shown that oocysts and sporozoites of *P. vivax* can exist for three months under conditions of artificial hibernation, being kept for short periods at 22° C. and then for 3 weeks at 4°-5° C. and even at times at zero. The authors caught specimens of *A. claviger* in November, 1928,

and allowed them to feed on two successive days on a patient experimentally infected with benign tertian whose blood was rich in gametes. They were then kept in a moist atmosphere for two days at 24° C., and every two or three at 15°–16° C. They were allowed to feed on a rabbit. From the middle of November to the beginning of March the temperature of their cage was never allowed to rise above 12° C., was often 6° and even 0° C. From mid March to mid April it was raised to 14°–16° and in May to 22° C. A healthy man was then bitten by some of these on three successive days and sixteen days later developed a typical attack of malaria, confirmed by blood examination. The feed of rabbit's blood obviously did not interfere with the development of the plasmodia. The experiments are to be repeated next year with the subtertian parasite.

H. Harold Scott.

HERRMANN (O.) & LIFSCHITZ (M.). Intrakutane Reaktion als Diagnose der Malaria. [**Diagnosis of Malaria by Intracutaneous Reaction.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 3/4. pp. 240–244. [19 refs.] [State Inst. for Med. Research Kazan.]

The authors employed watery extracts of blood clot from cases of acute malaria as antigen for the test. The control was horse's blood clot. At first the antigen was prepared from blood containing only *P. falciparum* but later blood containing *P. vivax* and *P. malariae* was employed also. For use the antigen was diluted 1 : 10,000 and 1 : 100,000 and the control 1 : 10,000 with normal saline. The dose is 0.1 cc. injected intracutaneously on inner side of forearm with a fine needle. A strongly positive reaction is indicated by a papule, about 2 by 3 mm. at least, developing after 24 to 48 hours; if the papule is smaller a weak positive is recorded. A negative result is registered in cases of complete absence of inflammation. In all 105 persons were tested (67 chronic malaria cases without plasmodia in the blood and 38 cases with different species of plasmodia in the blood). The test was strongly positive in 63 (60 per cent.); weakly positive in 27; in all 85.7 per cent. were positive. Of 15, in which the test was definitely negative, 7 at the moment had a definite febrile attack, during which probably fewer antibodies are present, and 3 were suffering also from other infectious diseases; if these 10 are not considered the positive reactions would be 94.7 per cent. The test was negative in all healthy persons and those suffering from other diseases examined [the number of the latter was very small]. The authors are continuing their experiments with a view to improving the method.

E. D. W. Greig.

STEINFELD (Fritz). Ueber die diagnostische Bedeutung des Malaria-pigmentes. [**Diagnostic Significance of Malarial Pigment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 631–635. [Inst. for Ship & Trop. Diseases, Hamburg.]

On the suggestion of Professor MÜHLENS the author repeated the work of RISQUEZ and his pupil PINEDA, and also that of URRIOLOA. He studied 30 cases definitely diagnosed as malaria (benign and malignant tertian) at different stages of the disease. He employed a modification of Risquez's method for the examination of the blood and Urriola's

method for the urine. He concludes that the finding of intracellular pigment in blood is good confirmation of the clinical diagnosis. With the methods so far available the presence of free pigment in the blood is not of value for diagnosis. In the urine he finds no pigment which can with certainty be recognized as malarial pigment.

E. D. W. Greig.

GOLDIE (Horatio). Notes on the Association of Malaria with Nephritis.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 503-510. [36 refs.] [Hadassah Med. Organisation, Jerusalem.]

The author does not agree with the current view that the toxins of *P. malariae* have a more powerful effect in causing nephritis than those of the tertian and subtertian parasites.* He has found that albuminuria and oedema occur more often in peasants from rural districts than in town dwellers; this he believes to be due to the longer duration of the disease among the peasants, before treatment is begun. He attributes the frequency of the same symptoms in quartan malaria to the same cause, that is to say, neglect of treatment. Quartan malaria is less acute than the other forms and does not drive people to seek treatment so soon; any form of malaria which becomes chronic may cause nephritis by prolonged toxic action on the kidney. He has found that albuminuria in the acute stage of malaria is most common in the subtertian form, but in chronic malaria it appears in all forms of infection. The process is almost always of the hydraemic type (nephrosis), in which there is oedema and a large amount of protein in the urine. Occasionally it is of the azotaemic type (glomerulo-nephritis) in which there is no hindrance to the passage of water and salt, but a distinct failure to excrete nitrogenous products. The author concludes from a study of the published records of post-mortems made in other countries, that the characteristic lesions of malarial nephritis are those of nephrosis, namely, fatty degeneration of the tubules. He found that the nephritis of malaria was completely cured by specific treatment, and that plasmoquine and quinine acted better than either drug alone.

W. F.

ORENSTEIN (A. J.). Can Quinine Distribution be expected to reduce Malaria in South Africa?—*Jl. Med Assoc. South Africa.* 1929. Sept. 14. Vol. 3. No. 17. pp. 479-481. [8 refs.]

Quinine has been distributed in the malarious areas of the Transvaal and Natal for a number of years, but no reliable statistics have been kept on which its value can be assessed. The author instances the experiments of YORKE and MACFIE, which showed that quinine has no marked effect on sporozoites, and also the experiments of the brothers SERGENT, which showed that a dose, equal to the ordinary curative dose, is necessary to prevent fever and that, even then, it is not enough to prevent infection. In the course of his own experience

* See this *Bulletin*, page 508; review of GIGLIOLI'S "Malarial Nephritis."

in Dar-es-Salaam, prior to the war, quininization was carried on, not only among Europeans but also among natives, and was controlled by regular blood examinations. The doses of quinine were 15 grains daily for 6 days, followed by 15 grains twice a week for ten weeks. If the blood was not clear at the end of treatment the course was repeated. At the end of ten years, he examined 100 native adults and 50 children, selected at random, with the result that parasites were found in 32 per cent. of the adults and 52 per cent. of the children. Furthermore, statistics kept by the Germans showed no diminution in malaria incidence during this period, either among the European or the native population. He concludes that the administration of quinine will reduce sickness and incapacity among the residents, but will not reduce the number of infections; though mostly free from actual fever the population will still suffer from the sequelae of the disease, the economic status of the poorer classes will still be subject to the handicap of a lowered physique, and new arrivals in the district will still become infected. In short, "one cannot escape the conclusion that to rely on quininization to reduce to any marked degree new infections in South African malarial areas is to lean on a very broken reed; on the other hand, the curative administration of quinine—under sufficiently expert supervision—is an invaluable measure in reducing incapacity from the disease and particularly in preventing mortality." He proposes the formation of a Malaria Division in the Public Health Department, which should select a few malarious areas and there inaugurate demonstration campaigns to show the public what to do, and how to do it cheaply and effectively with the means at their disposal. At the same time the Division should carry out propaganda and the treatment of the sick. The lines suggested are specifically a fine-tuned campaign directed exclusively against the carrier species about district—and the investigation of plasmoquine as a sterilizer of gamete cyte carriers.

W. F.

HUGHES (T. A.) & SHRIVASTAVA (D. L.). **Studies on the Enlarged Malarial Spleen. Part I. Effect of Adrenalin on the Blood Picture. Part II. Effects of Intravenous and Oral Administration of Quinine on the Blood Picture.**—*Indian J. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 651–655. [18 refs.]; pp. 657–665. With 2 text figs. [16 refs.] [King Edward Med. College, Lahore.]

I. A subcutaneous inoculation of adrenalin was given to three normal persons, and to ten with enlarged spleens. About twenty-five minutes later, there was a large increase in the white blood cells (12 to 42 per cent.) especially in the large lymphocytes and large mononuclears. The red blood cells were also increased, but in some of the malaria patients this increase was much less than in normal persons.

II. The intravenous injection of 6 grains of quinine hydrochloride produced similar changes in the blood of non-malarious patients, but in seven with enlarged spleens there was a fall in the number of red cells, and a subsequent increase in the bilirubin of the plasma which led the authors to conclude that some blood destruction had occurred.

Three patients were given 10 grains of quinine by the mouth and

films were examined daily. Within four or five days the red cells had increased by 6 to 15 per cent., and the white cells by about 50 per cent. Alkalis were given with the quinine.

W. F.

REYNOLDS (D.). **Forenote on an Alternative Method for the Administration of Quinine in the Treatment of Malaria.**—*Jl. Roy. Army Med. Corps.* 1930. Apr. Vol. 54. No. 4. pp. 296-298. [1 ref.]

The author recommends that quinine should not be given at fixed hours, but that the hour of the attack should be carefully noted and a dose of 15 grains given two hours before the next paroxysm is due; the object being to secure a maximum concentration in the blood at the moment when the vulnerable merozoites are free in the plasma. He gives two further doses at four-hourly intervals, and then no more until two hours before the next attack is expected. [The administrative difficulties of such a method are almost insuperable, especially where large numbers have to be treated.]

W. F.

SCHILLING (Claus). 'Wie wirkt das Chinin auf die Malariaparasiten?' [**How does Quinine act on the Malarial Parasites?**].—*Bcihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 66-68 (150-152). With 2 text figs.

Three days after therapeutic inoculation of two cases of general paralysis with a benign tertian strain, whilst the temperature was still normal but with some schizonts present in the blood, 1 gm. of quinine was given intramuscularly. The parasites disappeared from the blood on the fourth day in the two cases, the temperature rose to 37.7 and 37.8° C., and on the fifth day to 38.8 and 39.7° C., after 36 hours it sank to normal and remained so. Many authors consider that quinine acts indirectly by mobilizing the natural immunity processes of the human body. The view that antibodies plus quinine are the active agents appears to be negated by the author's observation. That antibodies should be developed 3 days after inoculation and the production should be hastened and fortified by quinine is contrary to experiences on antibody formation after inoculation of other antigens. Quinine has no effect on the initial fever so frequently observed in therapeutic inoculations; this agrees with the author's view that this initial fever is produced by lysis of the injected schizonts.

E. D. W. Greig.

HERRMANN (O.) & KOROBKINA (W.). Versuche der intrakutanen Malariabehandlung. [**Treatment of Malaria by Intracutaneous Injections.**].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Feb. Vol. 34. No. 2. pp. 123-128. [11 refs.] [State Inst. for Med. Research, & Central Malaria Station, Kazan.]

The authors treated ⁴⁶24 cases of chronic malaria without parasites in the peripheral blood and a few acute cases with parasites by this

method. They limited themselves to a $\frac{1}{2}$ to $\frac{1}{4}$ per cent. solution of quinine bihydrochlor., as the stronger solutions caused necrosis and pigmentation of the skin. The amount injected at a time was 0.2 cc. They conclude that in acute cases quinine gives distinctly better results when given by mouth than intracutaneously, but in chronic cases, especially those who have had a good deal of quinine by mouth, the intracutaneous method is useful. They point out that if the intracutaneous method proves satisfactory on further trial it will mean a very great economy in quinine. They consider that, as the dose of quinine by this method is so small, a direct parasitocidal action can be excluded, and the quinine acts probably by the inflammatory reaction stimulating antibody production.

E. D. W. Greig.

BORCHARDT (W.). Die Wirkung der Chininprophylaxe auf die Magen-funktionen (experimentelle Studien an Tieren). [**Studies on the Action of Quinine Prophylaxis on the Functions of the Stomach by Animal Experiment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Mar. Vol. 34. No. 3. pp. 164–166. [4 refs.] [Inst. for Ship & Trop. Diseases, & Physiol. Inst., Univ. Hamburg.]

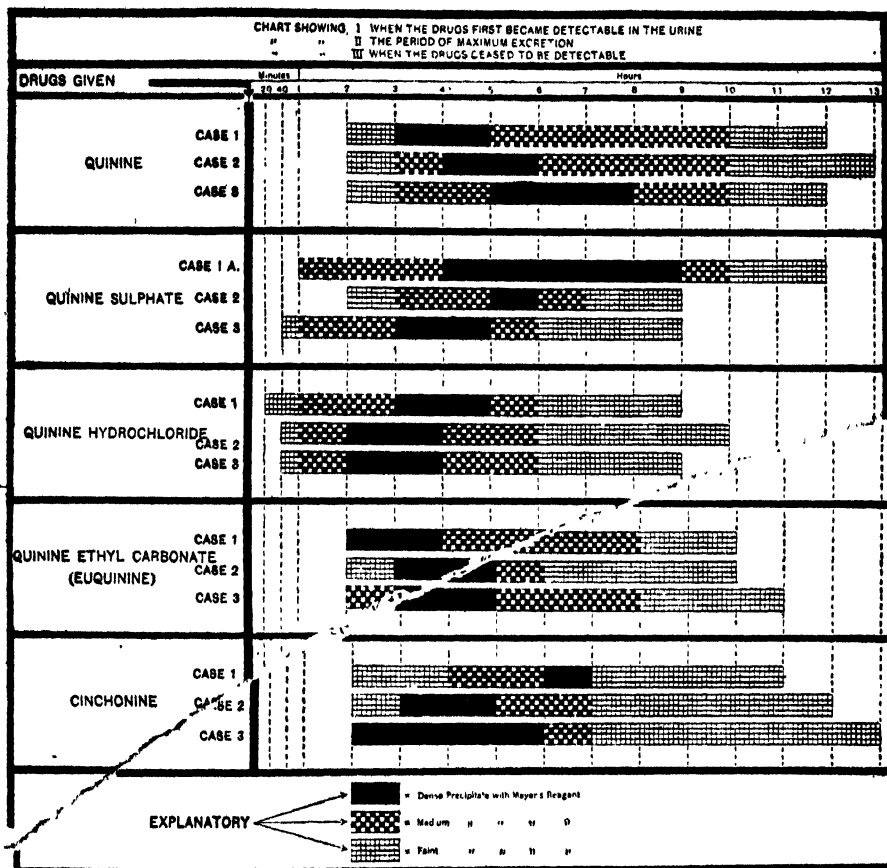
The experiments were carried out by duodenal fistula in dogs. A fixed diet was given throughout. The quantity of gastric juice flowing from the canula was estimated before administration of quinine. Full doses of quinine (0.25 gm.) were given, by mouth in some experiments and intravenously in others. The author concludes that the administration of quinine to dogs has no essential influence on the activity of the stomach, and it is immaterial whether the quinine is taken before or after food. He points out that this observation requires confirmation in the human subject.

E. D. W. Greig.

GREEN (Richard). **Notes on the Detection in the Urine of Some Drugs used for the Treatment of Malaria.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 614–618. With 1 chart. [6 refs.] [Inst. for Med. Research, Kuala Lumpur, F.M.S.]

The author administered the insoluble drugs euquinine, quinine base, and cinchonine, and also the soluble sulphate and hydrochloride of quinine, to three healthy persons of different nationalities. The drugs were given in powder form, and were followed by a drink of water. Subsequently the urine was examined for alkaloids by the addition of 15 drops of Mayer's reagent to 10 cc. of filtered urine. (Mercuric chloride, 6.8 gm.; Pot. iod., 24.9 gm.; water, 500 cc.). The results are shown in the following diagram. In all cases, the alkaloid appeared 20 to 120 minutes after the drug had been swallowed and it disappeared in 9 to 13 hours. The alkaloids generally took about three times as long to appear when they were given in an insoluble form.

The absorption of plasmoquin was investigated on similar lines by Schulemann's chloranil test (see this *Bulletin*, Vol. 25, p. 568). The small doses in which this drug is employed render its detection difficult. The amount present in small samples of urine was insufficient to give the colour reaction; it was necessary to extract several hundred cc. of urine with ether in order to detect it, and therefore the total amount



Results obtained with Mayer's reagent for detection of cinchona alkaloids in the urine of healthy persons after administration of drugs used in treatment of malaria.

[Reproduced from *Indian Medical Gazette.*]

of urine passed during eight-hour periods was tested. Plasmochin was present in the urine passed during the first eight-hour period, but not after.

W. F.

WAMPLER (Fred J.). **A Preliminary Report on the Early Effects of Plasmochin on *P. cathemerium*.**—*Arch. f. Protistenk.* 1930. Vol. 69. No. 1. pp. 1-6. With 11 coloured figs. on 1 plate. [9 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Canaries were inoculated with the parasite of bird-malaria, *P. cathemerium*, and treatment with 0.1 mgm. of plasmochin was begun about 48 hours after the appearance of parasites. The drug was given in solution through a bent oesophageal tube attached to a tuberculin syringe. Its effects appeared to be the same whether it was given immediately after segmentation or five hours before. The merozoites entered the blood cells as usual, but, 3 or 4 hours later, it was seen that many of the parasites were

poorly developed and stained feebly; vacuoles appeared in the cytoplasm, the chromatin was more prominent than usual, and soon, nothing remained of the parasite but its pigment. Contrary to expectation, the trophozoites disappeared more quickly than the gametocytes. "The avian parasites are intra-cellular; the place where the digested parasite had been, remains for a short time as a vacuole in the cytoplasm of the red cell. If the parasites were on the outside of the cell, it would not be possible for them to displace the cytoplasm in this way." [See AKASHI, below, p. 665.]

W. F.

SINTON (J. A.), SMITH (S.) & POTTINGER (D.). **Studies in Malaria, with Special Reference to Treatment. Part XII. Further Researches into the Treatment of Chronic Benign Tertian Malaria with Plasmoquine and Quinine.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 793-814. [52 refs.]

——. **Part XIII. Parosan and Dimeplasmine in Treatment.**—*Ibid.* pp. 815-820. [1 ref.]

i. An interesting point in this paper is the suggestion that different samples of plasmoquine may differ in toxicity. Seventeen robust young soldiers had been under treatment for several days without mishap when it became necessary to employ a new supply of the drug which had been obtained locally, with the result that eleven of them soon went down with toxic symptoms. The authors suggest that plasmoquine may deteriorate under certain conditions, although a sample of the local supply submitted to the maker was reported to show no increased toxicity. The doses given were 0.06 grams of plasmoquine and 20 grains of quinine daily. [Possibly the cumulative action of the plasmoquine may have been responsible.] The authors consider that certain races, such as Northern Europeans, may be particularly susceptible to the toxic action of the drug. Apart from racial and individual susceptibility, they suggest that a temporary metabolic disturbance, such as liver insufficiency, may determine a toxic effect during treatment. In a group of 48 patients undergoing a three-weeks' course of treatment, with 0.04 grams of plasmoquine and 20 grains of quinine daily, toxic symptoms occurred in 12. In some instances, the symptoms occurred after the drug had been discontinued.

Cyanosis and epigastric pain were the commonest early symptoms, but sometimes there was sudden severe vomiting, abdominal cramp, jaundice, albuminuria and collapse. As the results of their enquiry, they conclude that the combination of quinine with plasmoquine is better than either drug separately, in the production of a permanent cure in chronic benign tertian malaria, that the daily dose of plasmoquine should not exceed 0.04 grams, and that the daily dose of quinine given with it should not be less than 20 grains. They consider that plasmoquine should not be issued except under the constant supervision and control of the medical profession, until a safe dosage and method of treatment has been found.

ii. Seven chronic benign tertian cases were treated with dimeplasmine. It was not possible to arrive at any conclusion from the results, but its value in clearing parasites from the peripheral blood appeared to be almost the same as that of plasmoquine. [Major Sinton seems to have missed the account of GREEN's investigations, in which dimeplasmine was found to have no effect, either on the parasites or on the symptoms. (See this *Bulletin*, Vol. 26, p. 931.)]

Parosan oxide was supplied by Messrs. May & Baker, who gave its composition as 8-acetylamino 3 hydroxyl 1 : 4 6-arsenious oxide. One patient with subtertian, and five with chronic benign tertian malaria, were given 6 to 9 grams daily for 14 days. The subtertian case relapsed on the tenth day of treatment; one of the benign tertian cases relapsed on the day after treatment was stopped; another continued to have parasites in his blood while he was taking parosan and it became necessary to give him quinine.

The compound, quinine-parosan, was given to 14 patients with chronic benign tertian malaria. Four were given a dose corresponding to 0.6 grams of parosan and 0.9 grams of quinine; in the other ten, the doses of these drugs were respectively 0.9 and 1.35 grams. All those on the smaller dose, and three out of the ten on the larger doses relapsed within six weeks of the completion of treatment.

W. F.

DE MELLO (Froilano), BRAS DE SA (L. J.) & D'ARBEU (Mariano). Contribution à l'étude du traitement du paludisme par la plasmoquine. [**A Contribution to the Study of the Treatment of Malaria with Plasmoquine.**—*Giorn. di Batteriol. e Immunol.* 1930. Jan. Vol. 5. No. 1. pp. 25-66. [Med. Chirurg. School, Nova Goa.]

The authors' experience in the use of plasmoquine was the same as that of others who have used the drug. They found that it destroyed all forms of *P. vivax* and *P. malariae* and also the gametocytes of *P. falciparum*. The schizonts of the latter were readily destroyed by giving quinine with the plasmoquine. Very few of their patients showed toxic symptoms, and they were of a trivial nature; nevertheless, they do not think that the drug should be administered without medical supervision.

W. F.

KARAMCHANDANI (P. V). **Plasmochin Compositum in the Treatment of Malaria.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 626-629. With 4 charts in text. [Indian Military Hosp., Quetta.]

The author has seen only one case of intolerance in three years experience of plasmoquin. He gives the drug in doses never exceeding 0.02 gm. t.i.d., and always after meals, together with quinine and an ounce of glucose. In one instance, crescents persisted in spite of full doses of plasmoquin, but they disappeared when quinine was given in addition.

W. F.

BIGGAM (A. G.) & ARAFA (M. A.). **Observations on a Series of Cases of Artificially Induced Subtertian Malaria with Special Reference to the Effect of Treatment by Plasmoquine Compound.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 591-607. [19 refs.]

The authors have made further observations of syringe-borne subtertian malaria among the heroin addicts of Cairo, and they have now seen more than one hundred cases (see above, p. 202). Some of the addicts inoculated the heroin into their own veins; primitive

syringes, such as an eye-pipette with a needle stuck on the end, were often employed, and ordinary canal water was frequently used for making the solution. Severe diarrhoea, often with blood and mucus, was a common symptom in this heroin-malaria; but it readily yielded to anti-malaria treatment. Examination with the sigmoidoscope, in these cases, showed diffuse hyperaemia and swelling of the mucosa, with submucous hemorrhages, and superficial necrosis. Good results followed the treatment of a series of fifty cases with a combination of plasmoquine and quinine. Toxic symptoms were almost absent. Oral administration was found the most suitable. The majority of the patients were given plasmoquine 0.06 gram and quinine sulphate 0.75 grams daily for seven days, followed by four days' rest and three days' treatment repeated over a period of five weeks.

W. F.

MÜNS (P.). Ueber Plasmochin-Erfahrungen. [**On Plasmochin.**]—*Beih. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 44–50 (1234) [2 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The author refers to his recent experiences with plasmochin. He confirms the observations that its action is most certain and permanent in the quartan infection. As he has had two relapses whilst the two patients were in hospital he cannot confirm the previous favourable opinion formed in regard to malignant tertian infection. He finds it well tolerated in quinine idiosyncrasy and blackwater fever. It acts well in cases of malarial cachexia with very large spleens. He noted that the unpleasant secondary effects can be greatly reduced by giving doses of 0.01 gm. per 10 kilo. per day. He considers that the chief value of plasmochin will be the elimination of the crescent carrier.

E. D. W. Greig.

FRANK (A. W.). Zur Therapie des drohenden Malariaabortes. [**Treatment of Threatened Abortion in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Mar. Vol. 34. No. 3. pp. 161–164.

The author gives the history of two cases. He considers that quinine should be replaced by plasmochin in the treatment of threatened abortion due to benign tertian malaria and with plasmochin compound in cases due to malignant tertian malaria. He inclines to the view that plasmochin has an inhibiting action on the uterine contractions in incipient abortion.

E. D. W. Greig.

MAYNE (Bruce). **Tests on the Effects of Coumarin on the Life of the Mosquito and the Malaria Parasite.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 963–969. [2 refs.]

WILLCOCKS (see this *Bulletin*, Vol. 25, p. 557) attributes the relative immunity of Egypt from malaria to "something in leguminous plants, especially in certain kinds of clover, which makes mosquitoes immune from malaria." The substance concerned in legumes is said to be coumarin. The author confined mosquitoes in jars with absorbent

pads soaked in solutions of coumarin, prepared with crystals obtained locally, and fed them with raisins soaked in the same solution. These solutions, in the strengths employed, did not exert any deleterious effects upon the mosquitoes. Mosquitoes which had fed on malaria-infected birds were exposed to coumarin, but the development of the parasites within the mosquitoes was unchecked. In another experiment, larvae were bred out in water containing coumarin; the adults were kept with coumarin pads for two days and were then fed on infected birds. They were subsequently returned to the vessel containing the coumarin, with the result that the parasites developed normally, and eventually active, typical sporozoites appeared.

W. F.

GOLDIE (Horatio). Beobachtungen über Myosalvarsan bei Behandlung der Malaria. [**Treatment of Malaria with Myosalvarsan.**]—*Woch. Med. Woch.* 1929. No. 45. 16 pp. [24 refs.]

The author concludes that : (1) Intramuscular injections of myosalvarsan have a toxic action on all three species of malaria parasite, and have a specific therapeutic action on *P. vivax*. The general tone of the patient is improved by the slow absorption of arsenic. 20 cases were treated with injections of myosalvarsan. (2) The advantages of myosalvarsan over other salvarsan preparations are the absolute freedom from danger after intramuscular injections, and the greater intensity and prolongation of its action. (3) The combination of one to two injections of 0.3 gm. and a short course of plasmochin is a valuable form of treatment. 15 cases of benign tertian malaria were treated by this method.

E. D. W. Greig.

NAUCK (E. G.) & PICADO (C.). Malariabehandlung mit Cedrin. (Ein Glykosid der Simaba Cedrón.) [**Treatment of Malaria by Cedrin.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Jan. Vol. 34. No. 1. pp. 29-41. With 9 text figs. [1 ref.] [San Juan de Dios Hosp., San José, Costa Rica.]

The tree, *Simaba Cedrón* (N.O., Simarubaceae), is found on the Pacific coast of Nicaragua, Costa Rica, Panama and Columbia. Cedrin is extracted from the dried nuts. The active substance is apparently a glucoside. A 10 per cent. solution of the product is put up in ampoules and sterilized by autoclaving. On account of its unpleasant taste it is not suitable for oral administration and the parasites did not disappear from the blood after this method of administration. Better results were got by intramuscular and intravenous injection. The presence of casts in the urine indicates that the drug has a toxic action on the renal epithelium; the urine must be examined daily. The authors have not been able to obtain conclusive information as to relapse after treatment since the majority of their 17 patients were not seen again after leaving hospital. They conclude that Cedrin appears to be an active malarial remedy and is of interest because it belongs to the glucosides.

E. D. W. Greig.

CACCIAPUOTI (Giovanni). La riattivazione della malaria con la tubercolina. [**Reactivation of Malaria by Tuberculin.**—*Riforma Med.* 1930. Feb. 17. Vol. 46. No. 7. pp. 255-256.]

The author divided his cases into three groups: 1. Those who had already undergone prolonged treatment for malaria, who were believed to be cured, clinical and blood examinations yielding no signs, but in whom it was desired to know whether the cure was complete. 2. Those suspected of being malarious, but showing no signs clinically or in the blood. 3. Insufficiently treated patients. He injected them with 0.75-1 mgm. of carbolized Old Tuberculin. The first group gave no reaction; some of the second gave a typical febrile reaction with parasites in the blood; in the third group nine out of ten proved positive.

He concludes that injection of tuberculin is valuable from two points of view: First, in bringing to light latent malaria and so aiding diagnosis; secondly, in enabling cure to be accomplished on the old dictum of "No cure of latent malaria unless reactivated."

H. Harold Scott.

MURRAY (G. E.). Notes on the Use of Diéménal in Malaria. *Jl. Trop. Med. & Hyg.* 1930. Feb. 15. Vol. 33. No. 4. p. 57.

Three cases in which the blood was "strongly positive" were each given six injections of Diéménal. There was no fever afterwards and the author is of opinion that "the preparation is undoubtedly worth trying."

[In the advertisement issued by the makers, Diéménal is said to be "Colloid Manganese," obtained by the electric process. It is said to be "superior" to quinine administered alone, and notes of half-a-dozen cases are given in support of this statement.]

W. F.

CACCIAPUOTI (Giovanni). L'uso del cacodilato di sodio ad alte dosi nella cura della malaria. [**Cacodylate of Sodium in Large Doses in the Treatment of Malaria.**—*Riforma Med.* 1930. Mar. 24. Vol. 46. No. 12. pp. 452, 455-456. [3 refs.]]

The author treated ten cases of benign tertian malaria, eight of mixed infection, and one each of quartan and malarial cachexia according to the following scheme, using cacodylate of sodium in a strength of 0.25 gm. per cc. distilled water. [See note, p. 211, above.]

H. Harold Scott.

EUSTATZIU (G.) & IONESCO (V.). Contribution à l'étude de la pathogénie de l'accès de malaria et conclusions qu'on en peut tirer pour la malariothérapie. [**Study of the Pathogenesis of the Malarial Paroxysm.**—*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1929. Sept. Vol. 2. No. 2/3. pp. 325-338. [Serolog. Inst., & Central Hosp. for Mental Diseases, Bucharest.]]

The authors found it difficult to treat Rumanian patients by the Wagner von Jauregg method because so many of them were immune to malaria; 44 per cent. of the peasants and 10 per cent. of the town-dwellers proved to be refractory to the inoculation of 5 to 10 cc. of infected blood and, in those who were susceptible, the incubation was irregular, uncertain, and sometimes prolonged. These difficulties

were overcome by the intravenous transfusion of large quantities of blood. A Jubé apparatus was employed for the purpose, and all the usual precautions were taken with regard to blood grouping and asepsis. The transfusion of 200 to 250 grams of infective blood was invariably followed by success, and the long incubation period was abolished. The malarial paroxysm occurred at about the same time in the recipient as in the donor; it took place simultaneously in both if the transfusion was made during or shortly after a paroxysm in the donor, or if it was made twelve to twenty-four hours before one; otherwise the recipient's attack was a few hours later than the donor's. A quartan strain was employed, one which had been maintained by direct inoculation from man to man through many passages.

W. F.

HECHT-ELEDA (Margot). Zur Frage des Fiebertypus der Impfmalaria. [**Type of Fever in Inoculation Malaria.**]—*Wien. Klin. Woch.* 1930. Mar. 27. Vol. 43. No. 13. pp. 399-400. [8 refs.] [I. Clinic for Dermat. & Syph., Univ., Vienna.]

The author notes that in cases of general paralysis inoculated with benign tertian malaria the fever generally runs a quotidian course. Patients in the clinic suffering from syphilis in various stages and inoculated with malaria were studied as regards the course of the fever, 285 cases in all. All were inoculated intravenously with 3 to 5 cc. of blood. 247 showed a regular tertian type of fever, the highest point being fairly constant, ranging between 40° and 41° C. On an average nine rigors were allowed for the treatment. The greater frequency of the tertian type of fever in this class of case as compared with that in general paralysis is, in the opinion of the author, largely dependent on differences in the condition of the patients.

E. D. W. Greig.

IOFF (I.). Zur Morphologie der Parasiten der Malaria tropica (*Plasmodium immaculatum* Grassi u. Feletti 1891). [**Morphology of Plasmodium falciparum.**]—*Zent. f. Bakt. I. Abt. Orig.* 1930. Apr. 26. Vol. 116. No. 4/5. pp. 225-241. With 33 coloured figs. on 1 plate. [82 refs.]

The epidemic of malignant tertian malaria in 1922-1924 in south-east Russia gave the author the opportunity of investigating several hundred cases. From a study of the material he considers that dry blood film preparations are not satisfactory, as the results are not constant, depending chiefly on the duration of the drying; he also thinks that it is still too soon to reach a decision on the question of the varieties of the malarial parasites, and he further notes that too little attention has been paid to the question of biological variability of the malarial parasite.

[BRUMPT gives as a synonym of *Plasmodium falciparum*, *Plasmodium immaculatum* SCHAUDINN, 1902, not, as stated by author, Grassi and Feletti, 1891.]

E. D. W. Greig.

VILLAIN (Georges). Observations tunisiennes de plasmodies atypiques au cours du paludisme grave. [**Observations on Atypical Plasmodia during the Course of Severe Malaria in Tunis.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 352-363. With 35 figs. on 1 plate. [7 refs.]

Not all cases of severe malaria show atypical parasites in the blood but, nevertheless, the presence of such forms signifies a grave infection. The blood should be carefully examined in all cases, and should such forms be detected treatment must be vigorously applied, even though the symptoms be mild. The author is of opinion that these atypical forms, which have been called "*tenue*," "*caucasicum*," and so on, are not different species, but simple variations of the three established forms of malaria parasites, especially of *P. falciparum*, due, it may be, to an increased aggressiveness of the plasmodium, or to a decreased resistance of the host, or to both factors combined.

W. F.

WARASI (W.). Einige biologische Eigenschaften der Malaria Parasiten. [**Biological Peculiarities of the Malaria Parasite.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Mar. Vol. 34. No. 3. pp. 167-169. [9 refs.] [Inst. for Trop. Diseases, Tiflis.]

The author seeks to answer the question, why does the malarial parasite enter the red cell? He has not confirmed the view that it has a positive chemotaxis for haemoglobin as a food stuff. He studied the parasites, *P. falciparum* and *P. vivax*, in cultures outside the body following the method of Bass. From the experiments he considers that the malarial parasite is a strong aerobe, and enters the red cells on account of their oxygen content. He considers that the degree of saturation of the red cells with oxygen is not so important as the difference in oxygen tension between the red cells and the blood plasma.

E. D. W. Greig.

LAFFONT, BINET & LESINI. Un nouveau cas de paludisme congénital. [**A Fresh Case of Congenital Malaria.**]—*Bull. Soc. d'Obstét. et de Gynécol. de Paris*. 1929. Apr. Vol. 18. No. 4. pp. 296-297.

A primipara who had suffered from occasional attacks of malaria from childhood was admitted to hospital, in labour, with a temperature of 104°. Benign tertian parasites were found in her blood and, at the completion of labour, they were found in the umbilical cord. The infant had a temperature of 101°, twelve hours after birth, which came down after some injections of quinine, but it died on the twelfth day, three days after being removed from hospital.

W. F.

MARGINESU (P.). Tentativi di trasmissione della malaria alla scimmia ed al coniglio. (**Attempts to transmit Malarial Infection to Monkeys and Rabbits.**)—*Riv. di Malariologia*. 1929. Nov.-Dec. Vol. 8. No. 6. pp. 685-693. [8 refs.] [English summary p. 748.] [Hyg. Inst., Univ., Parma.]

The author inoculated young rabbits and monkeys (*Macacus rhesus*) with human blood, rich in sexual and asexual forms of *P. vivax*. An attempt was made to increase the susceptibility of the animals by various means, such

as splenectomy, blocking the reticulo-endothelial system, and haemolytic infection. The blood, examined over periods extending from a few hours to twenty days, never showed any parasites, nor was its inoculation into mental patients followed by malaria.

W. F.

KONSTANSOFF (S. W.). *Malariaimmunität, Malariavakzine und Vakzination. [Malarial Immunity, Malarial Vaccine and Vaccination.]*—*Zent. f. Bakt. I. Abt. Orig.* 1930. Apr. 26. Vol. 116. No. 4/5. pp. 241–256. With 4 charts in text. [25 refs.] [Crimean Pasteur Inst., Simferopol.]

The author prepares his vaccine by withdrawing 10–20 cc. blood from patients suffering from malaria into a 3 per cent. solution of sodium citrate; after mixing, the blood is centrifuged, and then placed on ice, then the plasma is pipetted off, the red cells are lysed with distilled water, and 0.2–0.3 per cent. carbolic acid is added. This is injected into the same patients. The number of plasmodial bodies in the autovaccines used by the author varied from 750,000 to 80,000,000 per cc. He treated 5 cases of *P. vivax* infection with autovaccines. Doses of the vaccine were from 2–5 cc. given subcutaneously in the apyrexial period at intervals of 10 hours to 5 days. From observations on the changes in morphology of the parasites following the injection of the vaccine he considers that immunity to malaria is gradually established.

E. D. W. Greig.

ANDRIADSE (N.). *Zur Frage des Kalium und Calciumgehaltes in dem Blutserum der Malaria-kranken. [Potassium and Calcium Content of Serum in Malaria.]*—*Nachrichten der tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 9–10. [In Georgian script. German summary p. 704.]

The potassium and calcium content of the serum was determined in 49 malarial patients (26 benign tertian, 18 malignant tertian and 5 mixed infections). The results showed that the calcium content of the serum in both infections varied very little. The potassium content of the serum was greatly increased during the attack owing to destruction of the red cells, but excretion was rapid, and in the apyrexial period it showed a drop below normal of 34.6 per cent. in the case of benign tertian and 83 per cent. in malignant tertian.

E. D. W. Greig.

JAMES (S. P.). *A Note on the Shute Technique for staining Malaria Parasites with Leishman's Stain and on the Stippling in Infected Red Blood Corpuscles which it reveals.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 269–278. With 1 text fig. [24 refs.]

—. *Addendum.*—*Ibid.* 1930. Jan. 30. Vol. 23. No. 4. p. 437.

In this paper, Col. James describes the staining technique employed by Mr. P. G. SHUTE, Laboratory Assistant in the malaria laboratory of the Ministry of Health. An important outcome of its use has been the demonstration of a hitherto unnamed type of stippling in blood corpuscles infected with quartan parasites, as well as the demonstration of Schüffner's dots and Maurer's spots at an earlier stage than usual.

The slides used in Shute's method are those known in the trade as "half white"; they should be dipped in nitric alcohol (30 parts nitric acid, 70 parts absolute alcohol), and after being wiped dry, should be kept in absolute alcohol.

The distilled water required for the process is shaken up in a one-litre flask and its pH is determined with a Baird & Tatlock's comparator, No. P.2759. Add three or four drops of a saturated solution of lithium carbonate to the flask and shake. Test the pH again and continue adding a few drops until the water in the flask becomes exactly of an alkalinity indicated by observing that after adding 0.5 cc. of a 0.01 solution of phenol red to 5 cc. of the water, the result in colour matches the tube marked 7.2.

The stain is made up with pure methyl alcohol ("free from acetone"), the reaction of which must be tested before use. A measured quantity is diluted with three times its bulk of the distilled water which has been adjusted to pH 7.2. If the colour, after adding 0.5 cc. of phenol red to 5 cc. of the mixture, matches the standard tube 7.0, the methyl alcohol is quite suitable. If, however, the mixture is more acid than this, add more lithium carbonate to the distilled water until it reaches a pH of 7.4. Test a mixture of this water and the methyl alcohol as before. If the resulting colour now matches tube 7.0, the alcohol may be regarded as suitable when used with a 7.4 water. Any brand of methyl alcohol not complying with the second test should be discarded.

To make up the stain, rinse a glass-stoppered bottle, made of hard green glass, with the methyl alcohol; put in 0.15 gm. of Leishman's crystals; add 100 cc. of the methyl alcohol; shake occasionally for the next 24 hours. The stain will then be ready for use. Do not use a pestle and mortar, do not filter.

To stain a blood film, drop four drops of the staining solution on the film, rock for ten accurately timed seconds, then add twelve drops of distilled water and mix thoroughly by tilting and rocking. Cover the slide with a Petri dish, and allow it to stain for 30 minutes. Although the older stages of the parasites will be too deeply stained, that period is necessary to bring out the quartan stippling and the Schüffner's dots and Maurer's spots in the very young stages.

On the termination of staining, a good stream of distilled water must be applied at once so that all stain and deposit is flushed off in the first moment. Washing in the stream of distilled water should be continued for 15 seconds by the watch.

Schüffner's dots are relatively large, round, numerous, and very distinct. The quartan stippling consists of dots and points, smaller and less distinct than Schüffner's dots. While Schüffner's dots can be stained in five minutes, quartan stippling is not demonstrable until after twenty minutes. Maurer's spots are larger, more irregular in shape, more darkly stained, and less numerous than the dots in either of the other types.

In English text-books Maurer's dots are wrongly named "Stephens' and Christophers' dots." SCHÜFFNER first described them in 1899; his friend MAURER in 1900 and 1902 confirmed and extended Schüffner's results by using Romanowsky stain in place of the Mannaberg and haematoxylin stains used by Schüffner. Col. James considers that ZIEMANN has the right of priority of observation and of description of the stippling associated with quartan parasites, and he suggests the title "Ziemann's stippling" to describe it. He believes that the *Plasmodium ovale* described by STEPHENS (see this *Bulletin*, 1923, Vol. 20, p. 296) was really a quartan parasite in a cell where the staining process happened to bring out the stippling.

Stippled red corpuscles not containing parasites are common in films from cases of subtertian malaria stained by the Shute technique, and they also occur, but less frequently, in films from cases of quartan malaria. [It will probably be necessary to modify this technique, if it is employed in hot countries, in order to prevent the stain from drying on the slides.]

JAMES (S. P.) & KAUNTZE (W. H.). **Malaria Parasites in Kenya and Uganda.**—*Kenya & East African Med. Jl.* 1930. Mar. Vol. 6. No. 12. pp. 338-346. With 1 coloured plate facing p. 337. [2 refs.]

The authors state that the changes in infected blood corpuscles which can be brought out by careful staining, afford the best assistance to the specific determination of the parasites, and this paper is largely a summary of the Shute method of staining blood films (see JAMES above).

The following formula is recommended for thick films :—

Azur II eosin (G. Grubler)	...	...	...	0.60 gram.
Azur II	...	...	...	0.16 gram.
Methyl alcohol	...	...	...	75.00 cc.
Glycerine (chemically pure, anhydrous)	...	...	...	25.00 cc.

Price's redistilled glycerine, or Merck's Bidistillata, is recommended. The stain should be diluted for use, in the proportion of 1 drop to 1 cc. of distilled water. Thick films should be allowed to dry without artificial heat, and should be stained for two hours without preliminary dehaemoglobinization.

A study of the characters of subtertian parasites in Kenya is considered especially needful, because it is uncertain that the usual text-book description of *P. falciparum* fits them exactly; ZIEMANN contends that the African parasite (*P. perniciosum*) differs in essential respects from the Italian form (*P. falciparum*).

W. F.

AKASHI (K.). **Study of Malaria Parasites by Aid of Supervital Staining.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1930. Feb. No. 299. pp. 4-5. [Govt. Hosp., Tainan.]

The author used Nile Blue, Brilliant Cresyl Blue and Neutral Red for the supervital staining of malaria parasites. The parasites were seen to consist of two portions, one which stained well, and another which was highly refractive and did not stain at all. The latter portion was twice the size of the stainable portion, and either surrounded it or was situated on one side of it. The parasites were elliptical or round, they did not assume the ring form observed in dried films. They appeared to lie on the surface of the corpuscles.

W. F.

GARIN (Ch.). **Recherches sur le sang des paludéens. [Researches on the Blood of Malaria Patients.]**—*Rev. Prat. Malad. des Pays Chauds.* 1930. Feb. Vol. 10. No. 2. pp. 55-62. [1 ref.]

The author found that anisocytosis was common in the anaemia of malaria, some erythrocytes measuring as much as 12 or 13 μ , while others were only 4 or 5 μ in diameter. Nucleated red cells were found in only 2 out of 4,000 films. [This is not the experience of all workers in the tropics.] The number of red cells varied between extreme limits of 895,000 and 6,240,000. The haemoglobin index was practically normal. The number of erythrocytes destroyed in a paroxysm was found to be 200,000 per cmm.; this figure was constant, and quite independent of the number of parasites. The reduction of red cells took place not only during the attack but also during the evolution of paludism. The number increased rapidly under treatment and sojourn at a high altitude. It was found that, contrary to expectation, malaria did not increase the fragility of the red cells, but augmented their resistance, and the infected corpuscles were no more

fragile than their non-infected neighbours. The number of leucocytes did not vary with the number of erythrocytes and was found to be a little above the normal, particularly during the attack. There was a relative mononucleosis and eosinophilia most marked in the intervals, but, just before a paroxysm, there was a great increase in the number of neutrophils which diminished during the attack. As the intervals between the attacks became longer and the patient improved, the number of neutrophils increased. Arneth's counts, made in 72 cases, showed a shift to the left.

W. F.

HUPPENBAUER (C. B.). Unsere Erfahrungen mit der Malaria der Versorgungsberechtigten. [**Malaria amongst Germans entitled to Relief.**]—*Beihfte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 35-41 (119-125). [1 ref.]

The author discusses the problems connected with disabilities amongst persons entitled to relief and who were said to have contracted malaria during the war. He indicates lines for dealing with such cases. An interesting discussion followed, in which a number of speakers took part. MANTEUFEL gave his personal experience of war malaria contracted in East Africa. The last occasion on which parasites were found in his blood was in 1923, but the malaria still gives rise to symptoms.

E. D. W. Greig.

MALARIA (CORRESPONDENCE).

STRICKLAND (C.) assisted by CHOUDHURY (K. L.) in collaboration with others. **A Report on a Mosquito-Malaria Survey of the Duars Tea Gardens. Including a Note on the Anophele Larvae found in Borrow-Pits by S. KINGSLEY-WARD and Some Factors in the Epidemiology of Blackwater Fever in the Duars** by Oliver McCUTCHEON.—pp. iv+145. With 3 figs.

"In the November number of the *Bulletin of Tropical Diseases* [sic] your reviewer apparently questions the tenour of a statement in a 'Report on a Mosquito-Malaria Survey of the Duars Tea Gardens' to the effect that those living under comparatively good conditions 'are as seriously affected by malaria as the labourer' and complains that no figures to support the statement are supplied.

"Now the probable reason why figures were not given is that they were not available, separate statistics for European morbidity and mortality in the tea districts not being published, and the usual endemic indices, of course, being useless on account of the scanty population. But even if the figures were published they might do but little to prove the truth of the statement, because of particular conditions only within the ken of those cognisant of life in the tea-districts. We here mention one or two of these circumstances.

"With regard to European sickness, those seriously ill from any cause are, if possible, sent to Calcutta or Home. The mortality rate of such cases then would not come on the local register.

"The European population is comparatively very small and mostly comprised between the ages 20 to 55, families usually consisting of the parents with only one or two children, who are sent Home at about six years of age. No comparisons of mortality in children of different types of nurture is therefore possible, and it is on the children that malaria levies the heaviest toll. European children in a malarial district require continual dosing with quinine to keep them even moderately healthy, and they have the advantage that the medical officer is in a position to give the individual care demanded.

" The European planter can usually be convinced of the necessity for a course of quinine, whereas there are few of the Indian clerks or coolies who will continue taking quinine when an attack of fever is over. This gives the European another advantage.

" Therefore, figures, if available, would give a very partial view and estate practice in Assam for over 20 years leads me firmly to agree that those living in comfortable circumstances appear to be equally liable to infection, and, if not properly treated, run the same chances of death or ill-health as the labourer living in a hut and subsisting on little but rice.

" Your reviewer also asks if the amelioration of the coolies' lot has not been worth while even if it has not reduced his malaria rate. The author's object, however, was obviously only the discussion of antimalarial measures, so that this question does not properly arise."

R. A. Murphy,
Medical Officer,
Luskerpore Valley Medical Association,
Sylhet, Assam.

Reply to Dr. R. A. MURPHY's letter.

" The sentence in Professor STRICKLAND's report, to which Dr. MURPHY refers, and which I think ought to have been supported by statistics, is as follows: ' the well-housed, highly-paid, and pampered planter, and the bloated babu are as seriously affected as the labourer.'

" Dr. MURPHY does not appear to distinguish between being ' infected ' and being ' seriously affected.' His twenty years' experience has convinced him that the European is as liable to infection as the native, and Professor STRICKLAND has found the spleen index of the latter as high as it was 20 years ago. On the other hand, one gathers from Dr. MURPHY's letter that the European is not so ' seriously affected ' as the native, that is to say he does not run the same risk of death or ill-health, and this is because he is sent out of the country when he gets ill, because he is better educated and because he receives more efficient medical treatment—in short, because he is ' pampered.' In the last seven years there has been no case of blackwater among the members of the European staff. The native, too, judging from a recent article by Dr. MURPHY (see this *Bulletin*, ante, p. 197), is less ' seriously affected ' than in the old days of squalor and neglect; though the spleen rate is about 80 per cent., the effects of this high rate of infection are less severe than would be expected."

William Fletcher.

LEPROSY.

LEPROSY REVIEW. 1930. Apr. Vol. 1. No. 2. 32 pp. With 1 text fig. Quarterly Publication of the British Empire Leprosy Relief Association, 29, Dorset Square, London, N.W. 1.

The most important article in this number is one by H. W. WADE on "Evolution of the Campaign in the Philippines." In this the reasons are given why "the plan of the anti-leprosy campaign in the Philippine Islands has undergone decided change in the past few years."

In 1901, when compulsory segregation was decided on, it was the only available method of controlling leprosy and the great Culion settlement for 5,000 cases was opened in 1906. "When all the known lepers had been transferred to Culion it was expected that the incidence of leprosy would decline rapidly thereafter, an expectation which did not materialise. This was largely owing to the fact that the health officials failed to realise that there would be remaining a large number of hidden or undetected lepers as a result of such measures . . . It is known that in a period of fifteen years the average number of cases segregated annually did not decline materially . . . A new era commenced in 1921 when, after preliminary small-scale trials, the new treatment work was systematically started at Culion. . . . It is perhaps difficult for any who have not experienced it themselves to realise just how great is the difference that the advent of a comparatively successful treatment has made in the whole situation. Once the superior effectiveness of the new treatment was determined it became possible to modify the campaign plan." Thus, when the public realised that a number of patients "were really being cured (or, if it be preferred, 'apparently cured') " lepers began to come voluntarily, and several hundreds now come each year. "Regional treatment stations" were now opened at Manila and Cebu and will be increased, where many hundreds of comparatively early cases are now being treated successfully without ever being sent to Culion. A second phase of the new campaign is the search for early cases and the opening of "a special skin clinic" at Cebu where early cases have been treated with success as out-patients during the last two years, and these are now being extended. "The results that are obtained at Cebu are very encouraging as to the possibilities of dispensary treatment for the comparatively easily cured incipient cases." The new system, then, comprises "segregation of the infective cases, attraction of such cases by the treatment and to some extent by local rather than distant segregation, dispensary treatment of the incipient cases, and intensive survey and educational work in the field." It is proposed gradually to extend this system region by region and "there is much more hope than ever before of seeing leprosy eradicated, or at least reduced to comparatively unimportant proportions."

This pronouncement has been given largely in the writer's own words in view of its importance to countries still enforcing unmodified compulsory segregation of all discovered lepers.

N. PAVLOFF contributes an instructive article on leprosy lesions in the nose and mouth; in this he advocates painting with Pot. Iod. 0.6 gm., Iod. cryst. 0.2 gm. and glycerine 30 cc. in the initial stage and for ulcers in the nose, while in limited affections still better results are obtained by painting with a solution of 5 per cent. chromic acid or 50 per cent. lactic acid. The chromic acid solution led to rapid healing of the ulcers.

The remaining articles are mostly reviews of already published work; they include leprosy in Norway by Dr. LIE, the value of the sedimentation test in leprosy treatment by Dr. Isabel KERR, work on

the Gold Coast by Dr. DIXEY, and the treatment by alepol and by Martindale's sodium gynocardate, which indicates a superiority of the former.

L. Rogers.

ROGERS (Leonard). **Recent Advances in the Treatment and Prophylaxis of Leprosy.**—*Edinburgh Med. Jl.* 1930. Jan. Vol. 37. No. 1. pp. 1-27. [88 refs.]

This account of recent advances in the treatment and prophylaxis of leprosy was the subject of the Cameron Prize Lecture delivered at the University of Edinburgh in October, 1929.

The author considers in turn local treatment, as by carbon dioxide snow and trichloroacetic acid, and next the use of vaccines and the results obtained from protein shock, methods which are not fundamentally separable when non-specific bacillary emulsions are employed. Of organic substances, naturally those considered in most detail are chaulmoogra and its derivatives—the gynocardates, hydnocarpates, ethyl esters, alepol, etc.—the history of their evolution, a brief account of their modes of employment and the results obtained being presented.

An interesting section of the lecture dealing with the "chemotherapy and mode of action of the chaulmoogrates and hydnocarpates" will help greatly in clearing the way from empiric to rational treatment of the disease.

Lastly, the advantages of voluntary clinics and relaxation of segregation in early non-infective cases, which the author has strongly advocated for years against not a little opposition, and the benefits of which are now becoming generally recognized, are again summed up at the conclusion of the lecture.

As a reasoned and well-balanced statement of what is known regarding the treatment of leprosy at the present day, the lecture is not only interesting and instructive but sounds a useful and, indeed, much needed note of warning to those who are inclined to publish favourable and unduly optimistic reports on some new alleged remedy after too short a period of trial and observation on too small a number of cases.

All those engaged in treating leper patients would benefit from a study of this clear summary. A full list of references is appended.

H. Harold Scott.

- i. SOUTH AFRICA, UNION OF: **Annual Report of the Department of Public Health Year ended 30th June, 1929** [MITCHELL (J. Alexander), Secretary for Public Health & Chief Health Officer].—*Leprosy* pp. 27-34.
- ii. ROGERS (Leonard). **Leprosy Policy. A Reply to Dr. Mitchell's Criticism of my Views on Compulsion Prophylaxis in South Africa.**—*Jl. Med. Assoc. South Africa.* 1930. Feb. 22. Vol. 4. No. 4. pp. 93-94.

i. Dr. J. A. Mitchell, in the former of these papers, puts forward his views on the compulsory segregation of lepers in strong opposition to those of Sir Leonard ROGERS, supporting his statements by the opinion of Dr. Cecil COOK on the measures suggested by him for dealing with the disease in Australia.

ii. To Dr. MITCHELL's strictures Sir Leonard Rogers replies stating that the former had misunderstood or misrepresented his views. Though opposed to a rigid system of wholesale compulsory segregation, he did *not* advise abandonment of the plan in countries where much money had been expended for this purpose, but he was of the opinion that it should be modified so as to prevent the harm resulting from concealment of the disease owing to fear of such segregation. He points out the necessity for attracting and treating patients in an early stage in order to effect a cure and lays stress on the fact that the use of injections of pure derivatives of the active constituents of hydno-carpus oil is far superior to the older method of oral administration of the oil in bringing about improvement, rendering non-infective and even curing a certain proportion of cases. The combination of early discovery and thorough treatment on modern lines should in course of time, "about two decades," render compulsory segregation unnecessary.

H. Harold Scott.

LEPROSY IN INDIA. 1930. Jan. No. 1. 36 pp. With 2 maps; & Apr. No. 2. 81 pp. With 2 plates (1 map). Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

This new journal is described as "A record of the Progress of Anti-Leprosy Work in India, with Notes on Methods used in other Countries." It is another tribute to the increasing interest in the subject since an effective treatment of the disease was discovered a little over a decade ago. The first number includes leprosy surveys in the East Godavari District and in the Nizam's dominions, which confirm the presence of several early cases for each advanced census returned one, and they have resulted in the establishment of new clinics in these areas. Oral sepsis in lepers is dealt with by Dr. Isabel KERR, and the cause of painful injections by Dr. E. MUIR. Reports on provincial branches and reviews of published work complete a useful number.

In No. 2 Dr. I. KERR deals with thyroid extract in the relief of symptoms of hypothyroidism; N. CHOWSKY with leprosy in the Bombay Presidency, where the disease is widespread in the villages, to deal with which an ambulatory service during the dry season is advocated; and E. MUIR describes the technique of intradermal injections. Reviews of recent work and reports from six treatment centres, mainly of local interest, complete the number. They are printed by the Delhi Printing Works, and can be obtained at an annual charge of Rs. 1, annas 8 (2s.).

L. R.

MAXWELL (James L.). *Leprosy in India*.—*China Med. Jl.* 1930. Jan. Vol. 44. No. 1. pp. 37-45. With 8 figs. on 4 plates. [Henry Lester Inst., Shanghai.]

This is an interesting study of the leprosy problem in India and a comparison with the position in China. The author's first impression was "the complete or almost complete disappearance of the mediaeval notions in regard to the segregation of lepers," due to the researches on treatment by Calcutta workers. The greatest leper settlement at Purulia was overcrowded with in- and out-patients without the

slightest compulsion, in contrast with the fact that "compulsory segregation drives into hiding the early cases which are the ones most amenable to treatment." This is due to the well-founded hope that the disease can now be cured, and practically all cases improve steadily, although the complete elimination of the disease is neither speedy nor easy as yet. The present hopeful outlook in India is in marked contrast to the fatalistic despair in China. A description of the Purulia settlement and of Muir's Calcutta Clinic follows, and the necessity of the Government of China supporting work on similar lines is pointed out.

L. R.

MAYER (T. F. G.). **Distribution of Leprosy in Nigeria.**—*West African Med. Jl.* 1929. July. Vol. 3. No. 1. p. 26. With 1 map.

A very short note with a map of the incidence of leprosy in Nigeria shaded to show the areas in which it is "rare" up to being "prevalent." It is based on a reply to a questionnaire and further information is asked for. [In a letter to the reviewer Dr. Mayer reports that about 4,000 lepers are now being treated in settlements and at clinics in Nigeria on an entirely voluntary basis.]

L. R.

SIRO (Fadda) & FERRUCCIO (Cotta Ramusino). Distribuzione generale della lebbra in Somalia. Note epidemiologiche e cliniche. [**The Distribution of Leprosy in Italian Somaliland. Epidemiological and Clinical Notes.**]—*Arch. Ital. Sci. Med. Colon.* 1930. Jan. 1. Vol. 11. No. 1. pp. 14-22. With 5 text figs. (1 map). English summary (4 lines) p. 23.

A spot-map gives the distribution and prevalence of leprosy which exists mainly along the coast and the Scebeli River. On this map are shown the places where the disease is believed to have existed in the past and the varying intensities of prevalence at present; it is worst at Gelib, Algoi, and Balad. Macular forms are commonest. There is a leprosarium at Gelib founded in 1927 with 50 inmates, and an agricultural colony capable of maintaining 60 patients is projected for Audegle.

H. Harold Scott.

TISSEUIL (J.). Quel a été, à ce jour, l'avenir des guérisons cliniques de la lèpre, en Nouvelle-Calédonie. [**The Outcome of Clinical Cures of Leprosy in New Caledonia.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 63-77. [3 refs.]

Between 1902 and 1928, 34 lepers have been discharged recovered from the New Caledonia institutions, of whom 13 are known to have relapsed, or 38.2 per cent., and since 1921 the relapse rate has been 50 per cent. Cures have more frequently been obtained in the more recent cases within two years of entering the sanatorium, and some persisted after from 1 to 4 up to 20 years.

L. R.

SANTIAGO (Varella). A lepra no Rio Grande do Norte. [**Leprosy in Rio Grande do Norte, Brazil.**—*Brasil-Médico*. 1930. Feb. 8. Vol. 44. No. 6. pp. 167-171. With 4 text figs.]

The first case known or recorded is that of a medical student showing symptoms in 1864 and dying ten years later, and until the beginning of the present century cases were few. In 1926 a leprosarium was established and in the last six months of that year there were 3 inmates; during 1927 there were 12 more admissions, in 1928 37, and in the first five months of 1929 another 36. Allowing for deaths and discharges there were at this time 88 patients; 85 were examined for the bacilli in the nasal mucus and 75 were positive. Twenty-six came from the Natal Municipality, 9 from Macahyba, 9 from José de Mipibú, 7 from S. Gonçalo, 7 from Cearámirim, the remainder in ones and twos. Of the 88, 59 were males, 29 females; the larger numbers, 20, were between 41 and 50 years of age, and next, 19, in the third decade. The majority are said to have contracted the disease in Pará or Amazonas, or from patients who themselves came from these districts.

H. Harold Scott.

MENDIOROZ (Julio). Historia y censo de la lepra en Salta. [**History of Leprosy in Salta, Argentine.**—*Semana Méd.* 1930. Jan. 30. Vol. 37. No. 5 (1881). pp. 291-308. With 10 text figs. [14 refs.]

This article is almost entirely statistical. The author, after giving an account of the Province, geographical and meteorological, sketches the progress of leprosy in the eighteenth century and up to 1929. Details are not of much value until he comes to the present century. At great labour he has got together notes of 125 lepers now in Salta, and the number has been increasing of late. During the last 44 years of the nineteenth century 24 cases only were recorded, but in the 29 years of the present century 101 cases, and the number in the last decade is double that of the preceding. The increase is proportionately much in excess of the growth of the population. Since 1869 the population has doubled while leprosy has increased twelve times, and from 1914 the increase in population has raised it to 1.2, the lepers to 3.2. In 67 of the 125 cases their place of infection was determined: Capital 41, Rosario de Lerma 8, Cerillos, Guichipas and Merán 5 each, Orán in the Lerma Valley 3.

H. Harold Scott.

LAMPE (P. H. J.) & SIMONS (Ch.). Lepra in Suriname. [**Leprosy in Surinam.**—*Nederl. Tijdschr. v. Geneesk.* 1929. Oct. 19. 73rd Year. 2nd Half. No. 42. pp. 4903-4915. With 1 text fig.]

The incidence of leprosy in Surinam during the period between 1927 and 1929 was investigated. To attract more patients to the clinics the isolation of lepers was not insisted upon, and gratuitous treatment was offered. The number of registered patients who attended the clinics increased considerably and a fairly accurate estimation of the incidence of leprosy in Paramaribo and surroundings could be made.

At the end of April, 1929, the number of lepers in Surinam was about 1,200, i.e., 9 per 1,000 inhabitants. The incidence is greater amongst males, the predominant age being 10-14 years. The most common

type of the disease is the lepra maculosa. As to treatment, improvement of general hygienic conditions was aimed at and various chaulmoogra preparations were administered, per os, by injection or externally as soap or ointment. The results in a number of cases were very good. Early skin eruptions disappeared in young children after six months of the treatment.

The author noticed that the acute symptoms which occasionally appeared after the administration of chaulmoogra preparations were often followed by an improvement of the patient's condition.

H. Lwow.

DENNEY (O. E.). **The National Leper Home (United States Marine Hospital), Carville, La. Review of the More Important Activities during the Fiscal Year ended June 30, 1929.**—*Public Health Rep.* 1929. Dec. 27. Vol. 44. No. 52. pp. 3169–3176.

"The optimism referred to in recent annual reports from this hospital has continued progressively to increase; the hopeful outlook of a considerable proportion of the patients is reflected in both the patients at large and the personnel." This opening statement is borne out by the following details. During the year ending June 30th, 1929, there were admitted 49 new and 9 patients who had absconded, 13 died, 19 were paroled with leprosy arrested and 6 more were fit for parole, but elected to remain owing to deformities. The treatments most used are chaulmoogra oil orally in daily doses of from 9 to 375 drops, and bi-weekly injections of benzocaine-chaulmoogra oil in 5 cc. doses with improvement in nearly all on the latter method. In patients with conjunctivitis and iritis diphtheria antitoxin has been used with favourable results, especially in the relief of pain. In some cases the application of heat from 50° to 52° C. with considerable pressure for two to six minutes daily has caused absorption of lepromata in one to three months. Acid-fast bacilli were found in the sputum of a number of lepers, only some of which proved to be those of tubercle.

L. R.

DENNEY (Oswald E.), HOPKINS (Ralph) & JOHANSEN (Frederick A.). **Recoveries from Leprosy. An Analysis of the Records of Sixty-five Cases.**—*Amer. Jl. Trop. Med.* 1930. Mar. Vol. 10. No. 2. pp. 83–111. With 4 text figs. [U.S. Marine Hosp., Carville, La.] also in *Public Health Rep.* 1930. Mar. 28. Vol. 45. No. 13. pp. 667–687. With 5 figs. (4 on 2 plates).

This interesting paper deals with 65 patients released during the last ten years from the Carville leper hospital of the United States. Classification of the cases showed 12 nodular on admission, 26 mixed and 27 nerve, with averages of 5.8, 5.5 and 9 years respectively in hospital. In 55 chaulmoogra oil was given orally, with additional treatments in 39, and various other treatments were used in addition in some cases, so that a critical evaluation of the medical treatment was not possible. Parole was only granted after repeated physical and bacteriological examinations, and the relapses during the last ten years have been only 3 per cent. A diagram shows a considerably increased rate of discharge during the last five years, and the conclusion is come to that "advanced therapeutic measures and improved methods of hospitalization have increased the parole rate in this hospital."

L. R.

HENDERSON (John M.). **A Review of our Present Knowledge of the Bacteriology and Pathology of Human Leprosy.**—*Indian Med. Gaz.* 1930. Feb. Vol. 65. No. 2. pp. 93–106. [4 pages of refs.]

This is a valuable review of a difficult subject with an extensive list of references. The *Bacillus leprae* is first described; the vexed question as to whether the organism has been cultivated is not discussed but is said to be doubtful. Animal inoculations are considered briefly, and eight years' experiments on various animals at the Calcutta School of Tropical Medicine are said to have yielded no results worth recording. The microscopical characters of leprous lesions are described in detail on the lines of the author's previous publications and the various blood reactions are dealt with, together with the nature of the "leprous reaction."

L. R.

OLPP. *Gelöste und ungelöste Probleme der Lepraforschung.* [**Solved and Unsolved Problems of Leprosy Research.**]—Reprinted from *Verhandlungen d. Deut. Gesellschaft f. innere Med.* 1929. XLI Kongress Wiesbaden. pp. 257–265. [38 refs.]

The author in this lecture discusses the history and present state of our knowledge of the following aspects of leprosy: chaulmoogra oil treatment, the question when a case can be said to be cured, biology of the *lepra bacillus*, mode of infection, epidemiology, statistics, racial incidence, relations to other diseases, leprosy reaction, diagnosis and prognosis. He concludes that the chief present-day requirements are: The education of a large number of leprologists, the calling in of rhino-laryngologists for rapid diagnosis and confirmation of cure, the earliest possible certification of the diagnosis, the registration of patients and their treatment by specialists in clinically conducted hospitals and polyclinics, which must be separated from the asylums for far-advanced so-called "burnt-out" cases. Isolation is to be considered only for patients who are out of work and seriously ill or for advanced cases, for compulsory isolation nowadays does more harm than good. In leper asylums a rational work treatment is to be employed. The examination of the inhabitants of houses where contagious lepers are living should be systematically carried out for five years. The financial and social problem must be solved by the government departments and charitable societies. The intellectual and religious needs of patients are to be catered for in an organized manner. The population must have explained to them that leprosy is curable and that the earlier it is treated the easier it is to cure.

L. R.

BRAUL (J. E.). *Ueber die Rolle eines Insultes in der Ätiologie und im Verlaufe der Lepra.* [**The Role of Depression in the Aetiology and Course of Leprosy.**]—*Arch. f. Dermat. u. Syph.* 1930. Feb. 15. Vol. 159. No. 2. pp. 308–310. [10 refs.] [Crimean Pasteur Inst., Simferopol.]

The author points out that close contact with lepers, as in the case of attendants in leper colonies or leprous relations, does not necessarily result in infection. Moreover, the first symptoms may appear after some other depressing condition, such as severe colds or chills, when

the disease may make rapid progress either in the form of a succession of reddish slightly-raised patches, or as multiple lesions, called by W. J. ANDERSON pseudo-erysipelas leproïdes, often accompanied by fever. Brief notes are given of eight cases; these include the appearance of the first signs of leprosy after an operation in one, after extensive scalding of the feet in another, after an attack of influenza in five more and in the remaining one after an injection of oil of gynocardia; all of which appear to have predisposed to the onset of the first symptoms of leprosy.

L. R.

LINDBERG (K.). Un essai de classification pratique des lépreux. [**Classification of Lepers.**]—*Rev. Méd. et Hyg. Trop.* 1930. Mar.–Apr. Vol. 22. No. 2. pp. 73–78.

The author describes an elaborate classification in which A represents nerve lesions and B dermal ones, as in MUIR's nomenclature. The cases in each group are divided up into ten degrees from 1 to 10, instead of three by MUIR, and C is used to denote mutilations. Thus a mixed case may be called A³B¹C² for example. He classed 429 adults as A 10·7 per cent., AB 14·7, ABC 34·5, AC 39·6, B 0·7, and C 0·46.

L. R.

RODRIGUEZ (Jose). **The Early Symptoms of Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1929. Dec. Vol. 9. No. 12. pp. 447–451. [1 ref.]

It is not sufficiently known that leprosy can often be diagnosed clinically before cases are positive bacteriologically. The author has seen 205 such cases at the Cebu skin clinic in the Philippines and 100 cases are analysed. Half were under 20 years of age as usual, and at the probable date of onset 77 per cent. were below that age. In nearly half the duration of the disease was from one to three years, but varied from two months to 15 years, so this stage may last a long time. Numbness and paraesthesia are the earliest prodromal symptoms, and the main initial lesions were pale macules, reddish macules, and anaesthetic patches, while less frequent were urticarial-like rashes, vesicular eruptions, ichthyosis and atrophy of the hand muscles, and a single initial lesion was recognized in 93 per cent. of the cases. Many patients showed thickening of ulnar and great auricular nerves and also enlarged inguinal and supratrochlear glands.

L. R.

NATIVELE (R.). La bacillémie lepreuse. [**Bacillaemia in Leprosy.**]—*Rev. française de Dermat. et Vénéreol.* 1930. Jan. Vol. 6. No. 1. pp. 8–11. [11 refs.]

Since leprous bacillaemia was first described by GOUGEROT in 1906 it has frequently been reported. The subject is discussed once more in this short paper, and the occurrence of the bacilli in the circulation during febrile exacerbations with the appearance of new lesions is confirmed. They can occasionally be demonstrated microscopically by taking several cc. of blood from a vein, haemolysing it and staining the centrifuged deposit.

L. R.

HÄUPL (Carl). Beitrag zur Kenntnis des Knochenschwundes bei Lepra. [**Bone Atrophy in Leprosy.**]—*Acta Path. et Microb. Scandinavica*. 1930. Supplement V. pp. 35–36.

Bone changes in leprosy generally occur in one of two forms. One results from rarefied osteitis and periostitis of an inflammatory nature due to a mixed infection including the leprosy bacillus. In the other form atrophy and absorption of bone takes place, especially in the fingers and toes, in relation to trophoneuritic disturbances. In a specimen of the latter form affecting the toe nothing but adipose tissue remained, and sections of the neighbouring nerves showed that the bone changes could be traced to destruction of the nerve tissues. The vessel walls showed thickening, and joint alterations in the form of commencing arthritis deformans were found. The bone marrow consisted solely of adipose tissue.

L. R.

ALEIXO (Antonio). Lymphangite da lepra. [**Lymphangitis in Leprosy.**]—*Brasil-Médico*. 1930. Feb. 1. Vol. 44. No. 5. pp. 128–131. With 2 text figs. [2 refs.]

Of 56 patients examined 13 had a lymphangitis; 10 of these were of the mixed form, 3 of the nervous. Excision showed that the swellings consisted of nodules along the lymphatic cords. Though remarked on previous occasions, little attention has been paid to this condition.

H. Harold Scott.

HOPKINS (Ralph), DENNEY (O. E.) & JOHANSEN (F. A.). **Immunity of Certain Anatomic Regions from Lesions of Skin Leprosy.**—*Arch. Dermat. & Syph.* 1929. Dec. Vol. 20. No. 6. pp. 767–777. With 10 text figs. [1 ref.]

A survey of 302 lepers disclosed the fact that certain areas of the skin are rarely affected. These include the back of the ear, the concha, orbital side of the nose, the lateral palpebral area external to the outer canthus, the axilla, the inframammary fold in women, the interdigital surfaces and the perineum, and they are those less exposed to irritation by sunlight, heat, cold, pressure, friction and causes producing hyperaemia. Excellent photos illustrate this distribution of the lesions.

L. R.

STEIN (A. A.). Zur Morphologie der Viscerallepra. [**The Morphology of Visceral Leprosy.**]—*Arch. f. Dermat. u. Syph.* 1929. Vol. 158. No. 2. pp. 450–459. [36 refs.] [State Inst. for Exper. Med., Leningrad.]

The author's material was from 4 autopsies on leprosy men from the "Krutyi Rutschi" Leprosarium (Leningrad Government). He draws the following conclusions from his investigations:—

(1) The leprosy cells represent derivatives of the reticulo-endothelial system or of the histiocytes of the connective tissue.

(2) These cells constantly contain lipid inclusions which for the most part show a characteristic vacuolization. Morphologically or microchemically demonstrable cholesterin cannot be discovered in these cells.

(3) Apart from the leprosy cells or the cells of the reticulo-endothelial system, the bacilli and lipid dropules are demonstrable also in some endothelial cells, e.g., in the endothelium of the cutaneous capillaries. There is, however, no transformation of the endothelial cells into genuine leprosy cells.

(4) The lipoids contained in the leprosy cells are most probably of an infiltrative nature; in explaining their origin we must take into account the large quantities of lipoids (chaulmoogra oil and its derivatives) that are introduced into lepers for curative purposes.

(5) On the basis of statements in the literature and of the author's own observations he assumes that the lipid infiltration of the leprosy cells is of significance for the process of destruction of the lepra bacilli.

L. R.

SAIJO (Yoshika) & TAKINO (Masu'ichi). Die Nervenendapparate im leprösen Gewebe. [**The Nerve-Endings in Leprous Tissue.**]—*Acta Scholae Med. Univ. Imperialis in Kioto*. 1929. Vol. 12. No. 1. pp. 55-62. With 4 figs. on 1 plate. [Path. Inst., Imperial Japanese Univ., Kyoto.]

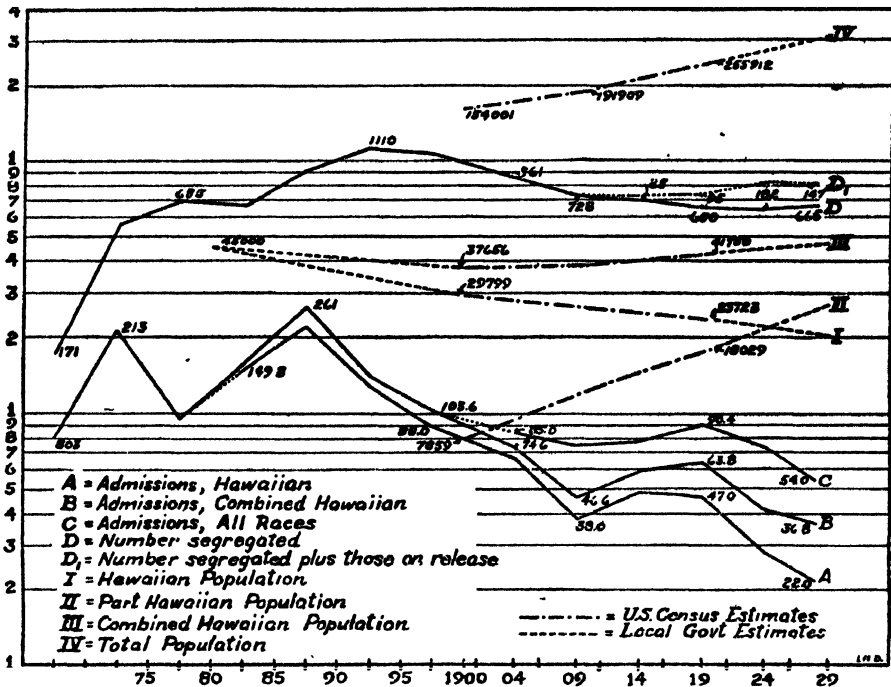
An examination of fresh material from two post-mortem examinations.

L. R.

WAYSON (N. E.). **Observations on the Treatment of Leprosy in Hawaii.**—*Public Health Rep.* 1929. Dec. 20. Vol. 44. No. 51. pp. 3095-3110. With 1 chart.

This paper gives an interesting account of 60 years' trial of compulsory segregation in Hawaii, the main facts of which are best brought out by the accompanying graph. A decline in the number of admissions is shown, but the population of Hawaiians, who are most affected, has fallen by 50 per cent. in the last 50 years. The total number of lepers was over 1,000 as late as 1890, but is now 700, and the number now segregated is approximately as in 1875. It is concluded that "it is improbable that the decreasing rate of leprosy in Hawaii is attributable to any great extent to the practice of segregation." Improved sanitation has played a part. The cost of segregation is \$1 per head of the population.

The effect of treatment is next discussed critically, including the use of ethyl esters intramuscularly in about 800 admissions since 1918. It is estimated that "perhaps from 8 to 10 per cent. of clinically recognized cases, even undergo arrest spontaneously" so the effects of treatment are difficult to evaluate [This is several times as high a figure as that of the Philippine average.] Tables are given of the results in terms of releases and relapses of 485 cases treated with the esters, and of 260 so treated for six months or more considered $3\frac{1}{2}$ and 5 years respectively after cessation of treatment; 30 to 33 per cent. were temporarily released, more than half of whom returned with relapses within three and a-half to five years, leaving about 15 to 18 per cent. of those treated to continue on release for longer periods, and about 80 per cent. of the latter were in the group negative bacteriologically. During the ten-year period prior to the use of the esters 8.8 per cent. were released. During the last two years 51 patients, or 25 per cent. of those remaining in hospital more than six months, have been released



Average annual number of lepers admitted and in segregation during 5-year periods from 1865 to June 1929 in relation to the Hawaiian, part Hawaiian, combined Hawaiian (Hawaiian and part Hawaiian or Hawaiian strain) and total population changes in Hawaii.

[Reproduced from *Public Health Reports*.]

temporarily and 2 have returned with relapses. The author therefore concludes that in the class of patients admitted under the compulsory segregation system the percentage remaining under release after treatment with the ethyl esters is approximately the same as before their use, and the results do not indicate any specific therapeutic value of the ester treatment. He thinks that much of the drug in this form remains unabsorbed in the muscles.

L. R.

FIJI ANNUAL MEDICAL AND HEALTH REPORT FOR YEAR 1928. pp. 58-74. With 1 graph, 2 diagrams & 5 plates.—**Report by Dr. E. A. Neff, Medical Superintendent, Central Hospital for Leprosy, Makogai.**

Dr. Neff, in his report on the results of treatment at the Central Hospital for Leprosy, Makogai, states that they permit him to be "thoroughly optimistic," for 53 patients were passed for discharge by the medical board, or 16.1 per cent. of the treated and 12.4 per cent. of the total patients. Every attention is paid to improving the general health and to providing occupation and amusements, in addition to steady persistence with the various modern preparations of chaulmoogra oil, including Alepol, sodium gynocardate, Wightiana ethyl esters manufactured locally and a similar preparation from a local "dilo" oil from the *Calophyllum bigator*, which he thinks is of some value as an

alternative treatment. The first two mentioned proved to be the most powerful therapeutic agents; the esters approach them closely in value, but cause more local irritation at the site of the injection. Weekly intramuscular injections of the various preparations are given into the deltoid and gluteus muscles. The "dilo oil" has useful analgesic properties. The "early" and "moderately advanced" cutaneous cases showed a higher percentage of improvement than the similar stages of nerve cases, but the latter gave a higher percentage of the total discharges. The locally grown *H. wightiana* trees are now 16-18 feet high, and 700 *H. anthelmintica* trees are well established; the seed was supplied by the British Empire Leprosy Relief Association several years ago. A number of excellent photos illustrating recoveries conclude a good report.

L. R.

SCHWETZ (J.). A propos du traitement de la lèpre par les éthers éthyliques de l'huile de chaulmoogra. (Hyrganol Poulenc et Graumanyl Meurice.) [**Treatment of Leprosy by Ethyl Esters of Chaulmoogra.**].—*Ann. Soc. Belge de Méd. Trop.* 1929. Dec. 31. Vol. 9. No. 4. pp. 319-339. [Parasit. Lab., Stanleyville.]

In the Belgian Congo leprosy is very unevenly distributed; it is most prevalent in the eastern province with one or two lepers in nearly every village, but the total numbers are unknown. At Stanleyville the author has treated fifteen well-marked cases with Chaulmoogra ethyl esters, and he concludes that the results were disappointing and the preparation cannot be considered a rapidly acting specific remedy.

L. R.

EUBANAS (F.). **Progress in Antileprosy Treatment at Cebu Treatment Station: Second Progress Report.**—*Jl. Philippine Islands Med. Assoc.* 1929. Dec. Vol. 9. No. 12. pp. 452-457. [5 refs.]

At this hospital during the semester ending June, 1929, 341 patients remained segregated, of whom 69 were negative, 87 had markedly improved, 52 moderately and 53 slightly improved; 65 were stationary and 15 worse, although the 89 new admissions had received less than six months' treatment with the esters. The paroled numbered 44 against 9 in the same period of 1928. A trial of buffered sodium hydnocarpate gave promising results in a short time.

L. R.

PINEDA (E. V.), PINEDA (E. R.) & DAYRIT (A.). **Leprosy Treatment at San Lazaro Hospital, Manila.**—*Jl. Philippine Islands Med. Assoc.* 1929. Dec. Vol. 9. No. 12. pp. 443-446.

This contagious disease hospital in the Philippines has a leper department in which uninfected cases can also be treated as outpatients without isolation. Pure Wightiana oil and the ethyl esters are used intramuscularly and by infiltration of the superficial cutaneous and subcutaneous lesions. Nasal leprotic ulcers are treated with 3 per cent. alepol or 20 per cent. Wightiana oil in vaseline scented with some volatile oil, and this is also used as preventive in markedly improved and negative cases. Relatively early cases come to this hospital; 375 patients were present in December, 1928, and of 335 treated

for six months and over 11 per cent. were negative, 62.6 improved and 17 per cent. worse, due to the progress of the disease being uncontrolled. "Slight" cases showed 30.8 per cent. negative, "moderate" ones 7.3 and of "advanced" cases only 1.3 per cent. cleared up. The present policy of keeping early cases in the regional-treatment stations at San Lazaro, Cebu and other places and sending only fairly advanced cases requiring longer treatment to Culion, is thus justified, for 16 of the early cases were cleared up in one to five months' treatment at the hospital.

L. R.

AOKI (T.) & AOKI (Y.). Zur Diagnose und Therapie der Lepra mit Berücksichtigung der intravenösen Injektion von Jodnatriumlösung. [**Intravenous Injection of Sodium Iodide in the Diagnosis and Treatment of Leprosy.**—*Dermat. Woch.* 1930. Mar. 29. Vol. 90. No. 13. pp. 438-451. [58 refs.]]

The difficulties in the diagnosis of some cases of early leprosy are pointed out and the authors' experience of the value of bacteriological examinations of the skin and of the nose respectively is in favour of the former as the more reliable. The diagnostic value of reactions following iodides has long been known, but is less marked in the difficult maculo-anaesthetic cases, while the therapeutic action is variable. They think it is best and most safely given intravenously, as the reactions are milder, and begin with 1 cc. of 5 per cent. sodium iodide, gradually increased at 10 to 14 days' intervals up to 20 cc. in some cases. They find this an excellent diagnostic and therapeutic method in early cases of leprosy.

L. R.

FIDANZA (Enrique P.), FERNANDEZ (Jose M. M.) & SCHUJMAN (Salomon). Sobre el valor del yoduro de potasio solo y asociado en el tratamiento de la lepra. [**Potassium Iodide alone and in Conjunction with Other Drugs in the Treatment of Leprosy.**—*Semana Méd.* 1930. Jan. 23. Vol. 37. No. 4. (1880). pp. 193-201.]

The cases recorded are too few to allow of anything more than general impressions being given. The results of iodide treatment were to produce a lighting up of the foci present, rise of temperature, pain in the limbs, a transient nodular erythema, prostration, rapidity of heart action, and an outpouring of bacilli into the blood due to destruction of lepra cells. When given alone the iodide was gradually raised to a maximum dose of 44 gm. [stated as grs. but gm. is evidently intended since the authors call 250 grs. "a quarter of a kilo"]. To counteract untoward effects a saline purge was given together with adrenalin, ephedrin, pyramidon, or calcium chloride, while the patient was kept on milk diet.

H. Harold Scott.

AMIES (C. Russell). **The Treatment of Leprosy with Solganal. A Record of Eight Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 309-314. [9 refs.] [Inst. for Med. Research, Kuala Lumpur, F.M.S.]

This is a short paper in which, after referring to previous trials of gold preparations in leprosy by PALDROCK and others, the author records

the trial of intravenous injection of solutions of solganal in doses gradually increased from 0.01 up to 1.0 gm. in eight cases of leprosy, all but one of which were early, not previously treated, and so favourable ones. Four had eye complications, as gold preparations have been advised for such cases. A table of the results showed that in one the drug was stopped on account of toxic symptoms, 3 of the others showed "slight improvement" and 4 more were "improved" after six months to two years' treatment. No reactions were caused, and he concludes that although no definite opinion can be given in so few cases, "the results suggest that it has a beneficial effect on leprosy." In two cases photophobia was reduced.

A table of the results in 31 cases treated with alepol shows 3 "much improved," 17 "improved," 10 stationary and 1 case "worse."

L. R.

DELANOE (E.). Traitement mixte de la lèpre : par l'injection intraveineuse de novarsénobenzol et par les injections intramusculaires de vaccin B.C.G. ; la parfaite tolérance de cette méthode de traitement, la rétrocession rapide des phénomènes morbides. [**Treatment of Leprosy by Novarsenobenzol and B.C.G. Injections.**].—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 898-903. [3 refs.]

Two cases of leprosy are reported in which the intramuscular injection of B.C.G. tubercle cultures proved to be harmless and, in combination with novarsenobenzol intravenously, was followed by manifest benefit.

L. R.

LE ROY DES BARRES (A.). Note sur un traitement indigène de la lèpre. [**An Indigenous Treatment of Leprosy.**].—*Rev. Méd. et Hyg. Trop.* 1930. Jan.-Feb. Vol. 22. No. 1. pp. 5-22.

A Cochin China remedy, consisting of 23 ingredients, varying from indigenous vegetable drugs to the bone of a tiger and the skin of a rhinoceros, was used in 26 cases, all of which are said to have derived benefit, especially as regards their general condition and in the appearance of the skin lesions, but less so as regards nerve symptoms. It is concluded that there was nothing marvellous in the results, such as has been claimed for this remedy.

L. R.

SEZARY (A.). L'autohémothérapie dans la lèpre. [**Autohaemotherapy in Leprosy.**].—*Bull. Soc. Française Dermat. et Syph.* 1930. Feb. 2. pp. 289-292. [1 ref.]

Brief notes are given of seven cases of leprosy treated by the subcutaneous or intramuscular injection of blood in a dose of 5 cc. followed by 10 cc. doses. No appreciable local or general reaction followed, but it is stated that a more or less favourable action was noted, especially in the form of decreased subjective symptoms and pain. No claim is made that the method is really curative.

L. R.

DE RAADT (O. L. E.). Das Ernährungsproblem in der Bekämpfung der Lepra und Tuberkulose. [**The Problem of Nutrition in the Combating of Leprosy and Tuberculosis.**].—*Ztschr. f. Tuberkulose.* 1929. Vol. 54. No. 6. pp. 492-496. [15 refs.]

The author refers to his theory, published several years ago, that the autophenolization of the human body has an injurious effect upon the

lepra and tubercle bacilli and therefore protects the body against both diseases, and that this autophenolization is a biochemical process which can only become effective in the normal human being when the diet contains a sufficient quantity of vegetable protein; hence the occurrence of leprosy in two quite distinct types of people, in the fish-eating population on the coasts of Norway, Sweden, in the South Sea Islands, etc., and in the inhabitants of tropical regions where the diet consists chiefly of vegetable food poor in proteins.

At the author's suggestion a number of his colleagues in the Dutch East Indies phenolized their pulmonary tuberculosis patients by means of the daily administration of 250 mgm. of phenolum cryst dissolved in cod liver oil (divided into 3 doses, one after each meal). This treatment was continued for at least 4 months. The results in 45 patients were as follows:—

1. A strikingly favourable effect upon the disease process was unmistakable, so as to justify the assumption that an autophenolization of normal strength must be able to protect the body against the disease.

2. The phenol was superior in its effect to the drugs of the guaiacol group.

No disadvantages were observed due to this medication.

During the period of phenol treatment the patient may have an animal diet without harm; it is to some extent an advantage, since animal protein is biologically most effective especially in weak, emaciated individuals. After cessation of this medication, however, it is absolutely necessary to prescribe a diet rich in vegetable protein.

The author believes that there are thus sufficiently weighty reasons for fundamentally changing the present-day lines on which lepers and consumptives are fed.

L. R.

SCHÖBL (Otto), PINEDA (Eloy V.) & MIYAO (Isao). **Clinical Skin Lesions in Philippine Monkeys resulting from Experimental Inoculation with Human Leprous Material.**—*Philippine Jl. Sci.* 1930. Mar. Vol. 41. No. 3. pp. 233-245. With 6 plates. [2 refs.]

A study of the literature shows very general scepticism regarding the transmission of leprosy to animals, since after inoculation of monkeys with leprosy material the temporary nodules do not furnish reliable evidence of the proliferation of the lepra bacilli in the animal tissues. The present workers have used the method of superinfection—which had proved of value in their hands in the case of yaws—with the result that after a fairly long incubation an allergic stage of tissue activity manifested itself in a rather sudden appearance of hard indurations at all the places of previous inoculation performed at various times during the incubation. Acid-fast bacilli were found, both single and in bundles; central breaking down of the tissues took place with discharge of pus containing acid-fast bacilli, sometimes phagocytosed, with formation of ulcers with drying and cicatrization from the periphery. Excellent photos of the infected monkeys are included in the paper.

L. R.

FRANCHINI (Giuseppe). Sulla riproduzione sperimentale della lebbra nella scimmia. [**Experimental Leprosy in the Monkey.**].—*Arch. Ital. Sci. Med. Colon.* 1930. Jan. 1. Vol. 11. No. 1. pp. 1-3. With 1 text fig. English summary (5 lines) p. 4. [Inst. of Trop. Path., Univ., Bologna.]

A *M. sinicus* was inoculated in the supraorbital region in April, 1926, with material from a leproma rich in bacilli. Two months later a nodule appeared and juice extracted from it contained Hansen's bacilli in masses and singly. The lesion cicatrized in a little over a month. Twenty-two months after the first inoculation a nodule again formed, containing bacilli, and again the lesion a month later was reduced to a mere thickening of the skin which was absorbed in a few weeks. In July, 1929, having in the interval maintained excellent health, the animal began to waste and muscular atrophy passed on to true paralysis of the limbs. At the old site over the eye a small nodule again appeared and contained bacilli in November; death occurred early the following month, but no macroscopic signs were found to account for the death.

H. Harold Scott.

GOMES (J. M.). Desvio do complemento na lepra. [**Complement Reaction in Leprosy.**].—*Rev. Biol. e Hyg.* S. Paulo. 1929. Vol. 2. No. 1. pp. 49-65. With 2 text figs. English summary pp. 65-67. [Hyg. Inst., S. Paulo.]

Hitherto this test has been carried out chiefly in advanced lepers, so the writer has tried it in early, suspected, carrier or contact cases, using fat-free Deycke bacillus as the antigen. He concludes that the test is of great diagnostic value in such cases and in healthy contacts may indicate immunity, and when such immunity fails, clinical symptoms begin to appear. Well-treated recent cases pass from a positive to a negative complement reaction. Plus reactions were obtained in 58.8 per cent. of 119 early cases, and in 66.7 per cent. of 63 suspected cases.

L. R.

AMIES (C. Russell). **The Wassermann and Kahn Reactions in Leprosy.**—*Malayan Med. Jl.* 1929. Dec. Vol. 4. No. 4. pp. 129-132. [17 refs.]

After discussion of the literature, the results of Harrison's Wassermann and the Kahn reactions in 362 lepers are recorded. They showed 37.5 per cent. plus against 20 to 25 per cent. of Malaysians with syphilis. The excess was found in all 17 reacting cases with high protein in the serum, and antisyphilitic treatments were effective in 75 per cent. of 90 positive cases.

L. R.

LUZ (A. Cerqueira). Contribuição ao estudo sorológico da lepra. [**The Serological Study of Leprosy.**].—*Brasil-Médico.* 1929. Dec. 14. Vol. 43. No. 50. pp. 1526-1529.

Two tests are here recorded, the Wassermann reaction and Rubino's corpuscle sedimentation. As regards the former, among 77 leper patients there were 4 strongly and 2 less marked but still definitely positive, 69 negative and 2 anticomplementary sera. With the Rubino test, using sheep's corpuscles, with or without formol, he obtained 21 positive, 21 negative, and 3 doubtful results among

45 nodular cases ; 6 positive, 11 negative, 1 doubtful among 18 nervous cases ; 8 positive and 8 negative among 16 of the mixed forms. Nevertheless, the author regards the test as of value because of the large proportion of positive results given in early or masked (frustra) cases. As controls he tested 76 cases of syphilis and 20 of tuberculosis, all of which were negative.

H. Harold Scott.

SCHLOSSMANN (K.). Die Kultivierung des Lepraerregers. I. Mitteilung. [**Cultivation of the Leprosy Bacillus.**—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 20. Vol. 115. No. 7/8. pp. 474–480. With 3 text figs. [4 refs.] [*Bact. Inst., Dorpat, Estonia.*]

In 1923 the author began a systematic attempt to grow the leprosy bacillus, which is not yet completed. He used media which had proved successful in the case of the closely allied tubercle bacillus, mostly including glycerin, on to which pieces of leprous tissue were implanted. He points out that in such primary cultures it is difficult to be sure if any multiplication of the lepra bacilli has taken place or not, and sub-cultures must be obtained for that purpose. He has planted out from the first cultures material very rich in acidfast bacilli, but since only two or three months have elapsed he is not able to say whether the sub-cultures have proved successful or not.

L. R.

WHERRY (W. B.). **Note on the Cultivation of an Acid Fast Bacillus from Leprosy.**—*Jl. Infect. Dis.* 1930. Mar. Vol. 46. No. 3. pp. 263–266. With 2 text figs. [2 refs.] [*School of Hyg. & Public Health, Univ. of the Philippines, Manila.*]

In this short note it is stated that CO₂ is essential to the growth of the tubercle and the leprosy bacillus, and methods of varying the O₂ and the CO₂ supply are described. An egg medium containing 3 to 6 per cent. of glycerin is used, with 1 per cent. agar and a little 10 per cent. glucose to make a semi-solid medium, and inoculated with numerous lepra bacilli from a nodule. No visible growth appeared, but after 4 to 6 weeks at 35° to 37° C. microscopic colony-like masses of acid-fast bacilli were found, which were regarded as cultures.

L. R.

DE SOUZA-ARAUJO (H. C.). [In Portuguese & English.] Estudos sobre a lepra. II. Tentativas de cultura do *Mycobacterium leprae*. (*Coccithrix leprae*, Lutz 1886.) Isolamento de um actinomyces de um leproma. *O. actinomyces lepromatis*, n. sp. (Amostra Hilda). **Studies upon Leprosy. II. Attempts to cultivate the *Mycobacterium leprae*. Isolating an Actinomyces from a Leproma. The *Actinomyces lepromatis* n. sp. (Hilda's Sample).**—*Mem. Inst. Oswaldo Cruz.* 1929. Vol. 22. In Portuguese pp. 145–152. With 4 plates (1 coloured). In English pp. 153–160. [1 ref.]

Cultures made from pieces of leprous nodules dissected out free from the skin are reported to have produced copious growth in a large variety of ordinary media, and to have developed into the *Actinomyces lepromatis*. The author concludes that he does not yet know the relationship of this organism to leprosy, but its isolation partially confirms the earlier work of DEYCKE, KEDROWSKI and others, while in fat-containing media it develops acid-alcohol-fast bacillary forms.

L. R.

KOIKE (Totaro). Impfversuch mit Blut von mit einigen chronischen Infektionskrankheiten behafteten Patienten, unter besonderer Berücksichtigung des Leprablutes. [**Inoculation Experiment with Blood from Patients affected with Chronic Infectious Diseases with Particular Reference to Leprous Blood.**]—*Okayama-Igakkai-Zasshi* (Zent. d. Okayama Med. Gesellsch.). 1929. Sept. Vol. 41. No. 9. pp. 2099–2106. [In Japanese. German summary p. 2107.] [Skin Clinic, Univ., Okayama.]

Koike has tested EHARA's statement that rabbit's testicle inoculated with leprous blood shows a specific change, and has further made the same experiment with serum, a suspension of blood corpuscles (1 part blood-corpuscles and 4 parts 0·9 per cent. salt solution) and inactivated serum (heated for 1 hour at 56° C.).

He concludes that leprous blood, chiefly the serum, contains a specific substance, sensitive to heat, which quickly atrophies the rabbit's testicle. Atrophy of the testicle was never observed in the case of healthy blood, and only to a slight degree in the case of blood from the syphilitic patients.

L. R.

MOLINELLI (E. A.) & VACCAREZZA (A. J.). El líquido céfalo-raquídeo en la lepra. [**The Cerebrospinal Fluid in Leprosy.**]—*Semana Méd.* 1930. Jan. 30. Vol. 37. No. 5 (1881). pp. 310–313. [11 refs.]

The fluid from 69 patients, 21 of the nervous form, 17 nodular and 31 mixed, was examined chemically and microscopically and the results are given in tabular form. All were inmates of the José Penna Institute for Infectious Diseases and had had the disease from periods varying from one month to thirty years. The results were almost completely negative, but are nevertheless instructive.

The tension as measured by Claude's manometer was normal, the Pandy and Nonne-Apelt tests for globulin were negative, the amounts of albumin, chlorides, glucose and urea (by Folin and Wu, Motr, and Ivon's methods) were none in excess of normal; leucocytes never exceeded 1·2 per cmm. and were usually from 0·6–0·8; Lange's colloidal reaction was negative in all but four, and in these the change was so slight as to be regarded as of no clinical significance. The Wassermann reaction was positive in 17 sera, but negative in all the spinal fluids. In none were Hansen's bacilli found. In short, examination of the spinal fluid yields no information of any diagnostic or prognostic value.

H. Harold Scott.

TISSEUIL (J.). Réaction, chez l'homme, du tissu cellulaire sous-cutané et du derme, aux bacilles lépreux tués par la chaleur. [**Reaction of Subcutaneous Tissue to Lepa Bacilli killed by Heat.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 20–23.

Trials of the subcutaneous injection of emulsions of leprous nodules killed by heat and of MARCHOUX's *B. pulviforme*, both in healthy subjects and in clinically cured lepers, have been made, with the result that a slowly forming abscess appeared. In the case of lepers a similar abscess was produced by the *B. pulviforme*, but not with human lepra bacilli emulsions.

L. R.

LE GAC (P.). La réaction de Botelho dans la lèpre suivant la technique d'Itchikawa et de Baum. [**Botelho's Reaction in Leprosy by the Technique of Itchikawa and Baum.**—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 105-106. [3 refs.] [Abidjan Lab., Ivory Coast.]

In view of the difficulty in confirming a diagnosis of leprosy this reaction has been studied in the following manner. Place in a test-tube 0.6 cc. of serum 24 hours after taking the blood, one drop pure ammonia, 3 cc. of 1 per cent. nitric acid in 7.5 per cent. physiological saline and 0.5 cc. at a time up to 0.3 cc. of iodine 1 gm., KI 2 gm. in 210 gm. distilled water, and shake after each addition. A positive reaction is indicated by the immediate formation of a permanent precipitate. The iodine solution must be freshly prepared every 2 to 4 weeks. Tests have been made in 87 bacteriologically positive lepers with positive results in 63, or 72.4 per cent. The reactions were more frequent in nerve than in nodular cases.

L. R.

MARKIANOS (J.). L'ultra-virus de la lèpre des rats. [**The Ultra-Virus of Rat Leprosy.**—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 896-897. [Pasteur Inst., Paris.]

This is a brief record of the results of inoculating five rats with material from rat leprosy which had been passed through a L_2 Chamberland filter. In several of the animals numerous acid-fast bacilli were found, together with ulceration and enlargement of glands containing them. This confirms the existence of an ultra-virus stage of the organism of rat leprosy.

L. R.

VALTIS (J.) & MARKIANOS (J.). Influence du BCG sur la lèpre murine. [**Influence of B.C.G. on Rat Leprosy.**—*C.R. Soc. Biol.* 1930. Feb. 21. Vol. 103. No. 7. pp. 483-485. [3 refs.]

Subcutaneous injections of BCG were tried in five rats infected with the *Bacillus stephanski*, and six more were kept as controls. The injections were well borne and soon absorbed without remaining trace. The authors conclude that the treatment had a favourable influence on the evolution of rat leprosy as shown by the healing of the cutaneous ulceration and a retardation of the generalization of the infection.

L. R.

MARKIANOS (J.). Essai de traitement de la lèpre des rats par les bacilles dégraissés. [**Treatment of Rat and Human Leprosy by Defatted Bacilli.**—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 145-148.

—, Recherches sur l'action préventive sur la lèpre des rats de l'antigène de bacilles dégraissés.—*Ibid.* pp. 149-150.

—, Application de l'antigène dégraissé de bacilles de la lèpre murine, dans le traitement de la lèpre humaine.—*Ibid.* pp. 150-152.

These three short papers relate to a series of interesting experiments in treatment by means of a vaccine prepared by separating the bacillus of rat leprosy in nodules from the animal tissues by digesting with pepsin in an acid medium or pancreatine in an alkaline one, separating the remaining acid-fast bacilli after neutralization of the medium, decanting and centrifuging. The organisms are then washed in water several times, and afterwards in absolute alcohol, and are finally defatted and sterilized in ampoules containing 300 millions per cc. Two infected rats were treated with this vaccine and six kept as controls, with the result that the treated rats showed more limited infections than the controls. In the second paper

an experiment is described in which the preventive action of the preparation was tested by injecting healthy rats with small doses of the preparation twice weekly with $\frac{1}{4}$ cc. doses up to a total of 4 cc. of the defatted bacilli, and two such rats were infected with the rat leprosy bacilli together with four controls, with the result that the treated animals showed less accentuated lesions than the controls with attenuation of the infective process.

In the third paper a case of human leprosy treated with the vaccine is recorded. The patient showed numerous macules with some infiltration of the skin and areas of anaesthesia. Doses gradually increased from 2 cc. to 8 cc. were injected one or twice a week subcutaneously without any general reaction, but with the production of a local sterile abscess without any acid-fast bacilli in the pus; after healing of this some improvement in sensation and diminution of the infiltration of the skin were noted indicating a favourable effect. Further work on these lines will be awaited with interest.

L. R.

MARKIANOS (J.). Essai de traitement de la lèpre murine. [**Treatment Trials in Rat Leprosy.**—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 268–272. [1 ref.]

Trials of nine new drugs on rat leprosy are recorded, of which "fleolate of sodium," "579B" and "579A" were found to exert a beneficial effect. They were supplied by MM. Fourneau and Sivadjan. Their chemical constitution is not given.

L. R.

ZOLKEVITSCH (Anna). Ueber die morphologischen und biochemischen Veränderungen des *Bact. leprae* Kedrowski unter dem Einfluss der Radiumemanation. [**On the Morphological and Biochemical Changes in *Bact. leprae* Kedrowski under the Influence of Radium Emanation.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. July 8. Vol. 113. No. 1/2. pp. 67–71. With 13 text figs. [1 ref.] [Med. High School, Leningrad.]

Cultures of *Bacterium leprae* of Kedrowski were inoculated on to potato and subjected to the action of radium emanation with results which are described.

L. R.

REVIEWS AND NOTICES.

ROGERS (Leonard) [C.I.E., M.D., B.S. (Lond.), F.R.C.P., F.R.C.S., F.R.S., etc.] & MEGAW (John W. D.) [C.I.E., V.H.S., B.A., M.B., B.Ch., B.A.O., etc.]. **Tropical Medicine.**—pp. x+536. With 77 text figs. & 93 coloured figs. on 2 plates. 1930. London: J. & A. Churchill. (Churchill's Empire Series.) [14s.]

The publication of a new text-book on Tropical Medicine must of necessity interest all those whose work lies in that branch of medical science. The authors in their preface state that "the issue of this volume calls for an explanation . . . they are convinced that there is a real need for a *small* work on tropical medicine which will contain only such details of microscopical technique as the general practitioner can carry out in his hospital or study, and will be devoted chiefly to the recognition and management of the diseases which are *commonly* met with in tropical and sub-tropical countries . . . another point which has been considered is that there are many students and even medical men who can *ill afford the time and money* which are involved in the study of the larger books" (the italics are the reviewer's). The book, therefore, "makes no pretence at being complete"; some rarer diseases are not mentioned, others whose distribution lies outside the British Empire receive but brief notice.

The diseases dealt with are ranged under eleven sections: I. Malaria and Blackwater Fever, Kala-azar, Trypanosomiasis and Chagas' Disease, Febrile Amoebic Hepatitis and Liver Abscess. II. Louse- and Tick-borne Relapsing Fevers, Rat-Bite Fever, Infective Jaundice group. III. Yellow Fever, the Dengue group. IV. Louse, Tick and Mite Typhus. V. Plague, Undulant Fever. VI. Amoebic and Bacillary Dysentery, Cholera, Sprue. VII. Leprosy, Yaws, Oriental Sore, Inguinal Granuloma, Tropical Ulcer, Madura Foot, Dermatomycosis, Ainhum, Chigger Disease, Climatic Bubo. VIII. Ankylostomiasis, Filariasis, Schistosomiasis. IX. Snake Poisons. X. Beri-beri group, Pellagra, Lathyrism. XI. Diseases caused by heat and light with some account of the incidence of general diseases in the tropics and hints on the use of the microscope.

Each chapter is a signed article by one or other author in each of which the writer sets out to describe anew a given disease and offer the readers facts from his large fund of experience. This makes very refreshing reading, but has led to a certain lack of systematization of the subject matter and headings and precision in description which may render reading rather difficult for the student with no previous knowledge of the subject. The authors have aimed at producing a *short work*, but let it be stated at once that their book is longer than such a standard text book as Manson's Tropical Diseases excluding the appendices. A full page illustration is allowed for rat-bite fever, over four pages are allotted to the history of malaria and room is found to discuss the quinine content of various plants. Upon those diseases in which the authors are more interested they have written fully, with authority and interest, drawing from their large collection of material in India, but other diseases just as important to the student in some other continent are less adequately dealt with. The book, therefore, which will be read by all students of tropical medicine, and more especially by practitioners in India with interest and profit, is one which is a little unequally balanced and, as must happen with any new work of the kind, is open to other criticisms which, since the authors invite criticism, may be mentioned here. A rigid scrutiny of the text would eliminate some ambiguous phrases, would regularize certain inconsistencies in reference to other authors, etc. Many facts might, one believes, have been included with benefit, but this is, of course, a matter of opinion. The plan purposely adopted of describing amoebic hepatitis long before dealing with amoebic

dysentery will not appeal to many readers and while amoebic abscess of the brain appears in the index and a page reference is given, no mention of the condition is made in the text. The method of describing the relapsing fevers is not very clear and no mention is made of *Spirochaeta duttoni*. Maps illustrating the geographical distribution of diseases are a feature of the book, but none is given for the trypanosomiasis, those for relapsing fever and dengue are for India only and all are on such a small scale that it is quite impossible to learn from a map whether the particular disease illustrated is found in any particular colony or province in a continent. Temperature charts, too, with which the volume is profusely adorned are in the majority of cases bare line drawings which do not make for clearness. Other illustrations are comparatively few, not always very clear, and when taken from the composite illustrations on the walls of the Wellcome Museum of Medical Science have suffered from reduction.

H. S. Stannus.

RILEY (William A.) [Ph.D., Sc.D., Department of Zoology, University of Minnesota] & CHRISTENSON (Reed O.) [M.A., Department of Zoology, University of Minnesota]. **Guide to the Study of Animal Parasites.** First Edition.—pp. xv+131. With 33 text figs. 1930. McGraw-Hill Book Company, Inc. New York: 370 Seventh Avenue. London: 6 & 8 Bouverie St., E.C.4. [\$1.50.]

In their introduction the authors point out that in the past the subject of animal parasitology has received but scant attention in the courses of zoology. The present generation has, however, seen a revolutionary change of attitude towards the subject, with the result that there has been an insistent demand for more attention to parasitic forms by departments of zoology. Under these circumstances, the authors have felt that there is place for a "Guide to the study of animal parasites."

The work is limited to the protozoa and helminths, the arthropods being omitted because in most schools where animal parasitology is taught, the work in medical and veterinary entomology is presented in a separate course, and because there are already available several excellent outlines for the study of the elements of entomology.

First comes a brief systematic review of the phyla which contain the animal parasites. The trematodes are next discussed, and chapters follow on the tapeworms and nematodes of man and animals. A special chapter deals with the determination of helminth infections through faecal examination, and contains a key to the eggs of helminth parasites in human faeces. The sources of the helminth material referred to are frogs, dog material, rabbits, rats and mice, together with specimens of human parasites obtained from dealers. The protozoa occupy about 35 pages; and literature, methods, and lists of parasites of laboratory animals comprise the last 36 pages.

There are 33 illustrations which range from the method of making blood films to the differential diagnosis of hookworms, Baermann's apparatus, and sections of amoebic dysenteric gut.

The idea of imparting knowledge of, and interest in, parasitology to the student early in his career is certainly laudable. The difficulty is to avoid giving him more information than he can absorb, and it appears to the reviewer that the average student of zoology will find this book rather too much for him.

The authors have done well to limit the size of the book to very modest dimensions, but, unfortunately, this, together with the wide field covered and numerous species dealt with, has resulted in a condensation that will make it very difficult for the ordinary junior student. In short, the reviewer feels that it is "too much and not enough."

However, the work is undoubtedly a step in the right direction. A really satisfactory text-book of elementary parasitology has yet to be produced; there is an urgent need for such a text-book and experience gained from the critical use of the present work will hasten its production.

W. Yorke

GIBSON (Alexander George) [M.D., F.R.C.P., Physician to the Radcliffe Infirmary & Reader in Morbid Anatomy in the University of Oxford]. **The Mycoses of the Spleen.**—pp. xii+169. With 17 figs. 1930. London: Kegan Paul, Trench, Trubner & Co., Ltd., Broadway House: 68-74, Carter Lane, E.C. [12s. 6d.]

The purpose of this book is to show that "splenic anaemia, acholuric jaundice and a group of cases with cirrhosis of the liver provisionally named Banti's disease have a common aetiology in that the spleen in most cases contains Gandy-Gamna nodules, that in the substance of these nodules can be found evidence of a mycotic invasion and that the organism belongs to the genus *Nocardia*."

After a general account of the various kinds of splenomegalies, clinical descriptions are given of 14 cases of splenic anaemia; 16 cases of Banti's disease; 6 cases of acholuric jaundice; and 6 cases of other diseases of the spleen. The following chapter is devoted to an anatomical and histological account of the infected spleens and a description of the mycelium-like structures observed in the Gandy-Gamna nodules in a number of cases—24 out of 56 cases examined. With respect to the mycotic organism claimed to be present, the author's conception that this organism may be a *Nocardia* [*Actinomyces*] in the outer part of the nodules and appear as thick, segmented hyphae resembling those of *Aspergillus* in the centre of the nodules would require very definite proof to be convincing. "The more central and probably older parts of the mycelial mass show more massive threads with septa and true branching. Their appearance here strongly suggests the appearance of the mycelia of one of the higher fungi such as *aspergillus*. . . ." Further, it is difficult to reconcile this view with the author's cultural results and the conclusions deduced therefrom, namely, that positive cultures invariably gave a *Nocardia*, which is the causal organism in such cases.

In the next chapter the results from spleen cultures and animal inoculation are described. In all, six cultures were obtained from infected spleens, of which four have been kept alive in culture. Of these four cultures, one was obtained from a case of acholuric jaundice; two from cases of splenic anaemia; and one from a case of Banti's disease. In all cases the organisms isolated were similar, and appear to be a new species of *Nocardia* which is named *Nocardia splenica*. *N. splenica* is not pathogenic for guinea-pig, rabbit, rat or mouse, but for monkeys it "is pathogenic and produces a slow illness leading to death." The monkeys used were *Macacus rhesus* (3), *M. sinicus* (9), and *Cercopithecus callitrichus* (4). In the inoculated animals the spleen was enlarged in practically all cases at some time, and all had tenderness in the region of the spleen; but in no case were Gandy-Gamna nodules developed, nor could hyphae be demonstrated in any organ. The same organism was recultivated from six of the monkeys.

The last chapter deals with the development of the mycotic hypothesis, and the author concludes that "the problem of the aetiology of these splenomegalies can only be proved by the repetition of the observations here detailed by numbers of other workers."

P. Tate.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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No. 9.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

ATKEY (O. P. H.). L'épidémie de fièvre récurrente au Soudan de 1926 à 1928. [**The Epidemic of Relapsing Fever in the Sudan, 1926 to 1928.**]*—Bull. Office Internat. d'Hyg. Publique.* 1929. Nov. Vol. 21. No. 11. pp. 1932-1933.

A louse-borne type of relapsing fever which first appeared in French West Africa in 1921, gradually spread across Africa via Chad and Wadai, until it reached Darfur in September, 1926, where in one district alone 10,000 died out of a total population of 45,000. By the establishment of quarantine posts and vigorous methods of control, including the destruction of lice, the progress of the epidemic was arrested and by the autumn of 1928 the disease had been stamped out of the Province.

[The suppression of an epidemic of this magnitude, which showed every likelihood of spreading into the densely populated regions of Kordofan and Gezira, is a remarkable tribute to the sanitary measures adopted and especially to the manner in which they were carried out.]

E. Hindle.

MALTZER (M.). La fièvre récurrente dans le cercle de Dori (Haute-Volta). [**Relapsing Fever in the Region of Dori (Upper Volta).**]*—Ann. de Méd. et de Pharm. Colon.* 1929. July-Aug.-Sept. Vol. 27. No. 3. pp. 435-441.

An account of a small epidemic of relapsing fever during 1927 and 1928 in villages of the Dori region. There were 137 cases with 27 deaths. With regard to transmission it is noted that both lice and bugs were present in very large numbers. Details are given of the clinical symptoms; the majority of the patients had two febrile attacks, but sometimes three were noted. They were treated by treparsol by mouth or novarsenobenzol. Although none of those treated by treparsol died of the disease, they all showed relapses but the duration of the febrile attacks was reduced. Intravenous injections of novarsenobenzol were found to be the simplest and most efficacious method of treatment as the symptoms disappeared within 24 hours.

E. H.

- i. DELANOË (P.). Contribution à l'étude du spirochète de l'*Ornithodore* des terriers du Maroc *Sp. maroccanum*, Ch. Nicolle et Ch. Anderson 1928. [**Study of Spirochaete occurring in Ornithodorus from Burrows in Morocco.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 272-342. With 6 charts in text. [Refs. in footnotes.] [District Hosp., Mazagan.]
 - ii. NICOLLE (Charles), ANDERSON (Charles) & COLAS-BELCOUR (Jacques). Sensibilité du porc-épic au spirochète des terriers des petits rongeurs sauvages du Maroc *Sp. hispanicum*, var. *maroccanum*. [**Susceptibility of the Porcupine to Spirochaete found in Burrows of Small Wild Rodents in Morocco.**]—*Ibid.* pp. 343-346. [2 refs.]
 - iii. — & —. Sur la notion d'espèce chez les spirochètes récurrents du Maroc et le rôle du porc-épic dans leur conservation et leur transmission naturelles. [**The Question of Species in Moroccan Relapsing Fever Spirochaetes, and the Role of the Porcupine in their Preservation and Transmission in Nature.**]—*Ibid.* pp. 347-351. [7 refs.]
- i. The first is a lengthy polemical article in continuation of the author's views as to the nature and origin of relapsing fever in Morocco [*ante*, p. 106]. Detailed experiments are reproduced in support of his opinion that a spirochaete obtained by him from *Ornithodorus* inhabiting the burrows of porcupines, is the same species as that of the Mansouria strain isolated by NICOLLE and ANDERSON from *Ornithodorus maroccanus*, captured in the neighbourhood of the burrows of small wild rodents.
- ii. The second article reaffirms the authors' views that in Morocco the porcupine is so rare that it can play only a secondary part as a reservoir of infection in comparison with the small rodents. Particulars are given of the successful infection of a porcupine with the Mansouria strain of relapsing fever. The animal died 10 days after being inoculated and on the two days preceding death showed spirochaetes in its blood from which the infection was reproduced in guineapigs, rats and mice.
- iii. The last paper consists mainly of a reply to the first one, but contains particulars of the infection of a human subject with the Mansouria strain of spirochaete. This patient showed five febrile attacks. The authors conclude that in Morocco there is only one species of spirochaetes transmitted by ticks, namely, *S. hispanica*, and there is not sufficient reason to create a distinct species, *S. marocana*, as proposed by DELANOË.

[The reviewer is in complete agreement with the arguments advanced by NICOLLE and ANDERSON as to the undesirability of making distinct "species" out of local strains of spirochaetes. Incidentally, this particular aspect of Moroccan spirochaetes has occupied nearly 150 pages in the last two numbers of the *Arch. Inst. Pasteur de Tunis*!]

E. H.

- NICOLLE (Charles), ANDERSON (Charles) & COLAS-BELCOUR (Jacques). Rôle d'*Ornithodorus erraticus* dans la transmission naturelle de deux spirochètes récurrents. Danger de la propagation de la fièvre récurrente hispano-marocaine à l'Algérie et à la Tunisie. [**The Role of Ornithodorus erraticus in the Transmission in Nature of Two Relapsing Fever Spirochaetes. Danger of Spread of Spanish-Moroccan Relapsing Fever to Algeria and Tunis.**]—*C.R. Acad. Sci.* 1929. Dec. 30. Vol. 189. No. 27. pp. 1220-1221. [2 refs.]

Attention is drawn to the wide distribution of *Ornithodorus erraticus* [which includes *O. maroccanus*, see this *Bulletin*, *ante* p. 324], since it

extends along the coast of the Mediterranean from Spain to Egypt. Consequently there is every likelihood of the Spanish Moroccan type of relapsing fever spreading towards the East and it is necessary to examine the cases of relapsing fever occurring in Tunis, to see whether they belong to this type pathogenic to guinea-pigs, or to the ordinary louse-borne *S. recurrentis*. In addition to *S. hispanica*, the tick *O. erraticus* also transmits *S. normandi* or its variety *carthaginensis*, and in Algeria it would be interesting to trace the distribution of these two types of relapsing fever.

E. H.

NICOLLE (Charles) & ANDERSON (Charles). Sur la nécessité de l'identification et d'un contrôle des spirochètes récurrents entretenus dans les laboratoires (note complémentaire). Avec quelques réflexions au sujet de l'homogénéité des spirochètes du groupe Dutton. [**Necessity for the Identification and Control of Relapsing Fever Spirochaetes maintained in Laboratories: Homogeneous Nature of the Dutton Group of Spirochaetes.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 268–271. [2 refs.]

This article is in continuation of that reviewed in this *Bulletin*, Vol. 26, p. 659. The authors have received letters from SCHÜFFNER and BRUYNOGHE confirming their opinion that the Amsterdam virus was *S. duttoni* and not *S. recurrentis*. Also BRUYNOGHE found that a second strain at his laboratory known as the Hamburg strain of *S. recurrentis* was really *S. duttoni*, a good example of the necessity for constant care in checking the identity of laboratory strains. Finally, the authors state that the relapsing fever spirochaetes seem to fall into two groups: a very homogeneous *S. duttoni* group, all the strains of which seem to be serologically identical (with the doubtful exception of this Amsterdam-Hamburg strain), in marked contrast with the remaining forms, all of which show great variation and a tendency to break up into serologically different races, so that one could almost form new species out of each strain.

E. H.

DELAMARE (G.). Points épigastrique, cystique et appendiculaire d'origine récurrentielle. [**Epigastric, Cholecystic and Appendicular Pains due to Relapsing Fever.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1930. Feb. 3. Vol. 46. 3rd Ser. No. 3. pp. 109–110.

Out of 50 patients infected with relapsing fever 30 had pain in circumscribed regions. 21 of these regions were epigastric, in the median line between the umbilicus and xiphoid cartilage. 7 patients with congestion of the liver showed tenderness in the region of the gall bladder. Finally, in 2 cases the region of the appendix was painful, the symptoms being such that one of the patients was operated upon and the appendix removed. Observations showed, however, that the symptoms were due to relapsing fever. Occasionally both epigastric and gall bladder pains occurred in the same patient, and once gall bladder and appendicular pains occurred together.

E. H.

DELAMARE (G.). La courbe thermique de la récurrente constantino-politaine de 1920-1921. [**The Temperature Curve in Constantinople Relapsing Fever during 1920-1921.**—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 904-906.]

A study of the temperature curves of 50 cases of relapsing fever in Constantinople, some of which were treated by injections of 914, whilst others were untreated. The results show that the spirochaetes of this epidemic possessed a high degree of arsenic-resistance. The nature and significance of the temperature curves are discussed in detail.

E. H.

DE MOOR (C. E.) & VEDDER (A.). Een geval van febris recurrens (type Duttoni) te Amsterdam. [**A Case of Relapsing Fever (Type duttoni) in Amsterdam.**—*Nederl. Tijdschr. v. Geneesk.* 1930. Mar. 8. 74th Year. 1st Half. No. 10. pp. 1227-1230. With 1 chart in text & 1 plate.]

The case was one of relapsing fever due to *Spirochaeta duttoni*, which is becoming notorious for its production of these laboratory infections. A diagnosis was made by examination of the blood by the thick drop method with finding of the spirochaetes. Of the animals inoculated with the patient's blood, two monkeys, two guineapigs and two mice, only one of the mice developed demonstrable spirochaetal infection. An intravenous inoculation of salvarsan brought the patient's infection quickly to an end, thus acting as *therapia magna sterilisans* in the sense of EHRLICH. A slight rise of temperature 7 days after the inoculation probably represented all that there was in this case of a relapse; no spirochaetes were found in the blood. No certain mode of infection of the patient was discovered, but it is probable that it occurred through a skin wound in the course of inoculation of the laboratory spirochaete strain from mouse to mouse.

W. F. Harvey.

TODD (John). **Treatment of Relapsing Fever.** [Correspondence.]—*Brit. Med. Jl.* 1930. Feb. 15. p. 312.

The writer, from Nyasaland, recommends the use of intramuscular injections of sodium potassium bismuth tartrate for the treatment of tick fever, instead of the usual novarsenobenzol. The latter is much more expensive and must be administered intravenously; in addition, although it brings down the fever rather more quickly than the tartrate, relapses are not uncommon, and two or three injections are generally necessary before the symptoms disappear. Sodium potassium bismuth tartrate brings down the temperature in 36 hours and relapses are almost unknown. The dosage for an adult is two intramuscular injections on two consecutive days, each of 0.2 gm. of the drug dissolved in 2 cc. sterile water; for a child 2 to 10 years old, the dose is halved; and for a baby under 2 years old, a single injection of 0.1 gm. is sufficient.

E. H.

ROSKIN (Gr.) & LEVINSON (L. B.). Arzneimittel und ultraviolette Strahlen. IV. Mitteilung. Die kombinierte Wirkung von ultravioletten Strahlen und Salvarsan auf die *Spirochaeta Duttoni*. [**Combined Action of Ultraviolet Rays and Salvarsan on *S. duttoni*.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 1/2. pp. 135-141. [8 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

Mice were inoculated with similar doses of a Berlin strain of *S. duttoni*, and when spirochaetes appeared in the blood were treated by

the injection of 0.00125 gm. salvarsan ("Altsalvarsan") per 20 gm. body weight.

Some of these mice were then exposed for 15 minutes to the action of ultraviolet rays at a distance of 40 cm. from the lamp, whilst others were kept as controls. Blood films of the mice were examined daily for 16 to 20 days and finally the brains inoculated into other mice in order to determine whether the infections had disappeared. Out of 47 mice exposed to ultraviolet rays after treatment 35 were cured and 12 not, whilst out of 41 controls not exposed to the lamp only one was cured by the injection of salvarsan. It is evident, therefore, that exposure to ultraviolet rays greatly increases the therapeutic and sterilizing action of salvarsan, in mice infected with *S. duttoni*.

E. H.

TSCHIREJKIN (W. Ch.). Ueber die Salvarsantherapie der *Recurrents bucharica*. [**Salvarsan Therapy in Bokharan Relapsing Fever.**] *Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Apr. Vol. 34. No. 4. pp. 211-220. With 10 text figs. [20 refs.]

Ten cases of Bokharan relapsing fever were treated by injections of salvarsan or its derivatives, but all except one showed relapses. Clinical details of the cases are given.

E. H.

NAMIKAWA (Hiroshi). Ueber zwei Fälle von accidenteller *Recurrents* infektion im Laboratorium, und Veränderung der Virulenz durch Menschen-Passage. [**Two Cases of Accidental Laboratory Infections with Relapsing Fever and Alterations in the Virulence in Human Passage.**]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1929. Dec. No. 297. [In Japanese. German summary pp. 65-66.]

A description of two laboratory infections successfully treated by neosalvarsan. After the human passage, the virulence of the strain towards mice seems to have been very much weakened.

E. H.

LEVADITI (C.), ANDERSON (T.), SELBIE (F. R.) & SCHOEN (R.). Présence du spirille de la fièvre récurrente (*Sp. Duttoni*) dans le cerveau des animaux immuns. [**The Presence of Relapsing Fever Spirochaetes (*S. duttoni*) in the Brain of Immune Animals.**]—*Bull. Acad. Méd.* 1929. Dec. 24. Year 93. 3rd Ser. Vol. 102. No. 42. pp. 705-710. With 3 text figs. [7 refs.]

A study of the Brazzaville strain of *S. duttoni* in mice, rats, rabbits and monkeys, showed that in the majority of cases where the brain was invaded by the virus, sooner or later there was a cytological reaction of the nervous tissue resulting in the production of a form of encephalitis. Although as a rule it is impossible to find spirochaetes in the nervous system of such animals, occasionally they may be seen in the cortex near the surface of the convolutions, but never in the cytoplasm of the nerve cells or neuroglia. The authors consider, therefore, that exceptionally the ultramicroscopic virus of this disease, which ordinarily is the only stage present during residual infections of the nervous system, may sometimes develop into the spirochaetal form.

These observations are extended to include cases of general paralysis, and it is suggested that as a rule the spirochaetal form is only one of the stages in the development of a neurotropic virus of *S. pallida*; the presence of isolated groups of spirochaetes in the cortex is considered to support the view that their sudden development is responsible for the production of the apoplectiform ictus in cases of this disease.

E. H.

VELU (H.), BALOZET (L.) & ZOTTNER (G.). Neurotropisme de *Spirochaeta hispanica* (souche de Mansouriah) pour le lapin; forme nouvelle de l'infection inapparente. [**Neurotropism of *Spirochaeta hispanica* for the Rabbit; a New Form of Inapparent Infection.**]—*C. R. Soc. Biol.* 1930. Feb. 14. Vol. 103. No. 6. pp. 381-383. [4 refs.]

Rabbits inoculated with this strain of relapsing fever were found to show residual brain infections, although in some cases the spirochaetes had never been found in the blood. [This is an independent confirmation of SCHLOSSBERGER and WICHMANN's observations on the same subject. See this *Bulletin*, Vol. 26, p. 664.]

E. H.

PAMPANA (Emilio). Sul neurotropismo dello "*Spirochaeta hispanica*" (febbre ricorrente spagnuola). [**The Neurotropism of *Spirochaeta hispanica*.**]—Reprinted from *Bull. e Atti Reale Accad. Med. di Roma*. 1928-29. Vol. 55. 7 pp. [Hyg. Inst., Univ., Rome.]

The spirochaete of Spanish relapsing fever differs from that of other types in producing an attack when inoculated into guineapigs and in having for its vector the *Ornithodoros maroccanus*. Examination of the brains of guineapigs recovered from infection showed no spirochaetes nor did their blood, nevertheless out of seven guineapigs inoculated with emulsions of brain tissue the disease was produced in six. Others injected with the blood of the same animals from which the brain emulsions had been made did not contract the disease. The brain was shown to be infective 100 days after the primary inoculation.

H. Harold Scott.

REMLINGER (P.) & BAILLY (J.). Spirille marocain (*Spirochaeta hispanica* var. *maroccanum*, souche Tetuan) et récurrentothérapie. [**Moroccan Relapsing Fever and its Therapeutic Use.**]—*C. R. Soc. Biol.* 1929. Nov. 29. Vol. 102. No. 32. pp. 635-637. [Pasteur Inst. of Morocco, Tangiers.]

The authors call attention to the advantages of using this strain of relapsing fever for the treatment of neuropsychoses and in particular general paralysis. The strain can easily be maintained in guineapigs by making a passage every 15 or 20 days. In order to produce infection it is only necessary to take a drop of blood from the ear of an infected guineapig and to place it on the conjunctiva of the patient undergoing this treatment. If desirable the course of the disease can readily be checked by the use of arsenobenzol. The virus can be transported by using infected ticks, or by simply defibrinating infected blood and preserving it *in vitro* in glass pipettes plugged with cottonwool. At room temperature (25° C.), such blood was found to be infective after 12 days and probably retains its virulence for longer periods.

[According to SAGEL (see this *Bulletin*, Vol. 26, p. 654) *Ornithodoros* infected with *S. berbera* produced such severe infections that this method of infection had to be abandoned; therefore it seems preferable to use infected blood, as suggested by the authors.]

E. H.

REMLINGER (P.) & BAILLY (J.). Transport à longue distance du spirochète hispano-marocain pour les besoins de la récurrentothérapie. [**Transportation over Long Distances of the Spanish Moroccan Spirochaete, for Therapeutic Use.**]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 153-155. [1 ref.]

Infected blood, defibrinated and collected in pipettes, was found to retain its infectivity for at least 20 days, and in the absence of ticks this forms a ready means of forwarding the virus. [See above.]

E. H.

HATT (Pierre). Observations sur l'évolution des spirochètes des fièvres récurrentes chez les ornithodores. [**Observations on the Development of Relapsing Fever Spirochaetes in Ornithodoros.**]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 258-264. With 5 text figs.

The author has studied sections of the organs of ticks fed on various strains of relapsing fever and dissected after different intervals and finds strong evidence in support of the view that the spirochaetes enter the cells of the tick and there break up into coccoid or bacillary forms from which young spirochaetes subsequently develop. In the case of *S. duttoni* in *O. moubata*, the disappearance of spirochaetes is complete after 3 days, but in the case of *S. hispanica* in *O. savignyi*, fragments of spirochaetes were found up to the 20th day, although on the 5th day spirochaetes appeared to be breaking up in the epithelial cells of the gut and on the 9th day these cells contained only coccoid and bacillary forms. The coelomic fluid of these ticks was constantly negative for spirochaetes up to the 26th day after the infective feed, when it became strongly positive and all stages were observed from short forms with only three spiral turns up to long forms with eight spirals.

In a third series of experiments in which *O. savignyi* were infected with *S. duttoni*, the spirochaetes reappeared in the ticks on the 19th day after the infective meal. Similar results were obtained with *S. normandi* in the same species of tick. In only one instance, a large adult female *O. savignyi*, were spirochaetes observed in the coelomic fluid of infected ticks as early as 6 days after the infective meal. As a general rule the author used nymphal stages for his experiments and never succeeded in finding spirochaetes in their coelomic fluid until the developmental period had elapsed, 20 days in one instance, 19 in another, etc.

A section of the ovary of an *O. moubata* infected with *S. hispanica* (see Fig. 5) is of especial interest. Only one egg in the ovary was found to contain spirochaetes, although the adjacent egg showed a few against its membrane, and this egg containing spirochaetes was the only one which contained any granules.

The author admits that his observations are somewhat fragmentary, but such as they are support the view that the spirochaete loses its



Fig. 1.

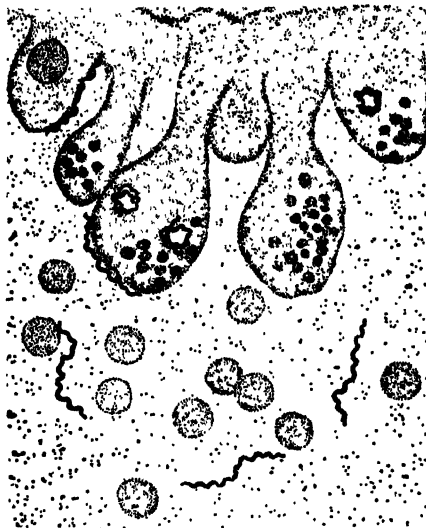


Fig. 2.

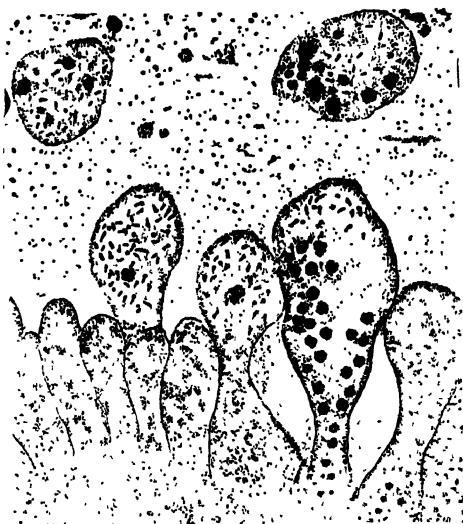


Fig. 3.



Fig. 5.

Fig 1. *Spirochaeta duttoni* in the intestinal contents of *Ornithodoros moubata*, one hour after the infective meal.

Fig. 2. *Sp. duttoni* in the intestinal epithelium of *Orn. moubata*, two hours after the infective meal.

Fig. 3. Intestinal Epithelium of *Orn. moubata*, three days after infection by *Sp. duttoni*.

Fig. 5. Ovary of *Orn. moubata* ; two eggs, one of which is infected with *Sp. hispanicum*.

spiral form in the tick and breaks up into small forms which form the starting point of a new cycle of development.

E. H.

CZARKOWSKA (J.) & BLANK-WEISSBEG (St.). Badania nad udziałem pluskwy (*Cimex lectularia*) w przenoszeniu duru powrotnego. Le rôle de punaise (*Cimex lectularia*) dans la transmission de la fièvre récurrente. [**The Rôle of the Bedbug (*Cimex lectularius*) in the Transmission of Relapsing Fever.**]—*Medycyna Doświadczalna i Społeczna*. Warsaw. 1930. Vol. 12. No. 1-2. In Polish. pp. 110-117. [7 refs.] French summary pp. 117-118. [State Hyg. Inst., Warsaw.]

The spirochaetes were found in the anterior part of the alimentary canal of bedbugs, up to 46 days after an infective feed. 24 to 48 hours after being ingested the spirochaetes become motionless, but retain their form. 6 to 7 days after infection very active spirochaetes appear in the haemolymph which may indicate some evolution. The injection of infected bugs up to the 15th day, and also of haemolymph containing spirochaetes, produces infection in mice.

E. H.

CUBONI (E.). Sur le pouvoir spirochéticide du sérum de sang de quelques animaux. [**Spirochaeticidal Action of the Blood Serum of Certain Animals.**]—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia*. Milan. 1929. Dec. Vol. 1. No. 12. pp. 274-275. [Sero-therap. Inst., Milan.]

—. Sul potere spirocheticida del siero di sangue di alcuni animali.—*Bol. Istituto Sieroterap. Milanese*. 1929. Dec. Vol. 8. No. 12. pp. 813-817. German summary pp. 817-818. [9 refs.]

The author mixed 1.5 cc. of each serum studied, either fresh or inactivated, with 0.2 cc. of a suspension of *S. duttoni* obtained from the blood of a mouse at the height of the first attack. For each species of animal the blood of 4-12 individuals was examined. The results show that this spirochaete will live in the fresh or inactivated serum of guineapigs, rabbits, pigeons, fowls and horses. Sometimes it remained alive in fresh pig serum, but usually the serum was spirochaeticidal. The fresh serum of cattle, goats and sheep invariably killed all the spirochaetes within 1 to 2 hours at a temperature of 37° C., but this action disappeared when the serum was inactivated by heating.

E. H.

REMLINGER (P.), CATANIÉ & BAILLY. Un cas de fièvre récurrente à spirochètes virulents pour le cobaye dans la zone espagnole du Maroc. [**Case of Relapsing Fever with Spirochaetes Virulent to the Guinea-pig in Spanish Morocco.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 383-386. [4 refs.]

The record of a case of relapsing fever occurring in a native who had been bitten by ticks in the Spanish zone of Morocco. The blood of the patient was inoculated into guineapigs which became infected showing a succession of febrile attacks accompanied by the presence of spirochaetes in the blood. This organism was compared with other strains of the same region and seems to belong to the group which includes *S. hispanica*, *S. hispanica* var. *marocana*, and *S. sogdiana*.

E. H.

JAHNEL (F.) & PENTSCHEW (A.). Ueber " Infektionen " von Vögeln mit Rekurrensspirochäten und Säugetiertrypanosomen. [**The " Infection " of Birds with Relapsing Fever Spirochaetes and Mammalian Trypanosomes.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Jan. 7. Vol. 115. No. 3/4. pp. 167–168. [7 refs.] [Kaiser Wilhelm Inst., Munich.]

Small birds (" rice-birds ") when inoculated with large doses of Spanish, Russian and African strains of relapsing fever, showed spirochaetes in the blood after a few hours, but these invariably disappeared within 24 hours and no relapses ever occurred. Also no trace of residual infection could be found in the brains of these inoculated birds. Similar results were obtained by the inoculation of *Trypanosoma brucei*, but these only appeared in the blood in very scanty numbers and soon disappeared.

E. H.

REMLINGER (P.) & BAILLY (J.). Passage de *Spirochaeta hispanicum* var. *marocanum* (souche Tetuan) de la mère au foetus. [**The Passage of *Spirochaeta hispanica* var. *marocana* from the Mother to the Foetus.**]—*C.R. Soc. Biol.* 1929. Dec. 6. Vol. 102. No. 33. pp. 741–742. [Pasteur Inst. of Morocco, Tangiers.]

In common with other strains of relapsing fever that have been examined with regard to this problem, the spirochaetes of a Tetuan strain of *S. hispanica* var. *marocana* were found to pass from infected female guineapigs to their offspring at all stages of gestation. The infection could not be transmitted by means of the milk of infected animals.

E. H.

CARRAL (G.) & CHAINET (P.). Sur trois cas de bronchite sanglante de Castellani, forme aiguë, observés chez des Européens et traités avec succès par l'acétylarsan. [**Three Acute Cases of Castellani's Bronchial Spirochaetosis, observed in Europeans and successfully treated by Acetylarsan.**]—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 296–306.

Clinical details are given of three cases, showing the usual symptoms of this bronchial affection in which *Spirochaeta bronchialis* was present in the sputum in large numbers. The intramuscular injection of 3 cc. of acetylarsan every 4 days caused the symptoms to disappear; first the cough, then the expectoration, next the pale red colour of the sputum gradually disappeared, and finally after 26, 29 and 36 days respectively, no abnormal pulmonary signs could be detected. The spirochaetes diminished in numbers but only disappeared after 30 to 40 days treatment.

E. H.

- i. SEGUIN (P.). *Treponema calligyrum* et ultra-virus spirochétique. [***Spirochaeta calligryra* and *Spirochaetal Ultra Virus*.**]—*C.R. Soc. Biol.* 1930. May 23. Vol. 104. No. 17. pp. 247–248. With 1 text fig.
- ii. MANOUELIAN (Y.). Gommès syphilitiques et formes anormales du tréponème. Ultra-virus syphilitique. [**Syphilitic gummata and Abnormal Forms of the Spirochaete. Syphilitic Ultra-Virus.**]—*Ibid.* pp. 249–251. With 1 text fig.

These two articles adduce fresh evidence in support of the view that spirochaetes have a granular phase.

i. Seguin working with *Spirochaeta calligryra*, an organism first isolated by NOGUCHI from genital condylomata, found that in cultures

two to three weeks old, typical division forms were very rare, but many abnormal forms were present. By a special staining method, to be described later, the author found very small spirochaetes 1 to 2μ in length each with a drawn-out spiral extremity resembling a terminal flagellum. These forms appear as mere granules, under dark ground illumination, and it is only after the special method of staining that the terminal spiral filament becomes evident. All intermediate stages were found between these minute forms and the normal spirochaete.

ii. Manouélian calls attention to the fact that spirochaetes are generally impossible to find, or extremely rare, in tertiary lesions of syphilis, although common at other stages of the disease. The study of sections of gummatous lesions has shown the presence of all stages from very minute granular forms through individuals with one, two, three spirals up to normal spirochaetes, but all these forms including the granules have a spiral filament. The small granular forms are considered capable of passing through filters. [It is evident that these forms are identical with the motile granule stage of spirochaetes that have been described by many previous observers especially in the case of relapsing fever spirochaetes, e.g., LEISHMAN, BALFOUR & HINDLE. By the special technique developed by Seguin the motility of these forms is shown to be due to a terminal spiral filament. It is of interest that KNOWLES, GUPTA and BASU (*ante*, p. 110) observed very short spirochaetes with a fine flagellum in the case of *S. anserina* in the tick.]

E. H.

MARCHOUX (E.) & CHORINE (V.). Le sang des poules piquées par les Argas est virulent en l'absence de spirochètes apparents. [**The Blood of Fowls bitten by Argas is virulent in the Apparent Absence of Spirochaetes.**—*C.R. Soc. Biol.* 1930. May 23. Vol. 104. No. 17. pp. 259-260.]

The authors found that fowls exposed to the bites of infected Argas often showed a rise in temperature within 12 hours, and although no spirochaetes could be detected by microscopical examination, the subinoculation of this blood into other fowls showed that it contained the infection. The authors conclude that in the case of the fowl spirochaete there is an invisible stage of the organism which precedes the appearance of the spiral forms. [It seems possible that the very short forms described above may have been present in the circulation.]

E. H.

MORODER MUEDRA (Juan). Estado actual del cultivo del treponema de la fiebre recurrente. [**Cultivation of Spirochaeta recurrentis.**—*Medicina Paises Cálidos*. Madrid. 1929. Nov. Vol. 2. No. 6. pp. 552-562. [40 refs.]

Reviewing the literature the author notes the irregularity of results of attempts at cultivation of the spirochaete of relapsing fever. He himself obtains uniformly positive results from a medium of pure rabbit-serum under anaerobiosis.

H. Harold Scott.

REMLINGER (P.) & BAILLY (J.). La fièvre récurrente au Maroc. Le spirochète marocain. [**Relapsing Fever in Morocco. The Moroccan Spirochaete.**—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 818-862. [35 refs.]

A useful summary of the present state of our knowledge of this relapsing fever.

E. H.

LEPTOSPIROSIS.

SCHÜFFNER (W.). Ueber das Vorkommen der Weilschen Infektion in Holland während der Jahre 1924–1929. [**The Incidence of Weil's Disease in Holland during 1924 to 1929.**]—*Arch. f. Hyg. u. Bakt.* 1930. Jan.–Feb.–Mar. Vol. 103. No. 1–3. pp. 249–257. With 1 text fig. [Inst. of Trop. Hyg., Amsterdam.]

During this period the author, together with his assistants, has observed 47 cases of Weil's disease at the Tropical Institute in Amsterdam; 11 out of the 47 patients died of the disease, usually on the 8th to the 11th day. Although 26 out of the 47 cases occurred during the months July to October, the others were spread fairly evenly among the remaining months, a matter of some importance in considering the possible influence of contact with water in the epidemiology of the disease. 21 of the patients had a record of having fallen in ditches or canals generally containing more or less impure water. The author, however, after numerous experiments, has failed to obtain any evidence in support of BAERMANN and ZUELZER's theory that the saprophytic water leptospira, which is common in Dutch waters, may acquire pathogenic properties for either guineapigs or mice. He is of the opinion, therefore, that in such cases of water infection, the water must have been previously contaminated by the urine of infected rats. Many of the other patients had worked in places where the chances of rat contamination were very considerable.

Jaundice was observed in 37 out of the 47 cases. With reference to the diagnosis of the disease, leptospira were cultured from the blood, organs, or urine of 12 cases. As soon as the jaundice appears the leptospira fall in numbers and are very difficult to find. Leptospira pathogenic to guineapigs were not found in the urine with any regularity but were observed in very severe cases about the 8th or 9th day. One of the cases that showed no signs of jaundice gave a positive result with blood culture. The majority of the cases, 35, were diagnosed by serological tests employing agglutination and lysis.

Details are given of an interesting case in which the patient's blood gave positive reactions for leptospira in dilutions of 1 : 50,000, but also contained Eberth's bacillus. The patient developed typhoid fever, but the bacillus was never agglutinated by dilutions of the blood higher than 1 : 100, whilst after two months 1 : 10,000 gave a positive reaction with leptospira. Dr. VITRINGA informed the author that out of 85 cases of typhoid the sera of 10 agglutinated leptospira which suggests the possibility of double infections. Another anomalous case is described in which the patient's blood gave positive reactions with four species of bacilli in addition to leptospira.

In conclusion the author points out that if Weil's disease is derived from the water leptospira, Holland, with its numerous ditches and canals, might be expected to show a much higher incidence of the disease.

E. Hindle.

RUYS (A. Charlotte). Een merkwaardig geval van de ziekte van Weil. [**An Exceptional Case of Weil's Disease.**]—*Nederl.-Tijdschr. v. Geneesk.* 1930. Jan. 18. 74th Year. 1st Half. No. 3. pp. 273–275. With 1 text fig. [1 ref.]

Typical Weil's disease shows, besides high fever, symptoms of great malaise, severe muscular pain, some renal affection and usually jaundice.

The history in this case is of a 7-year old child who had fallen into the water ten days before admission to hospital. But before this happened he had complained of abdominal pain and had suffered from diarrhoea and sometimes vomiting. On admission to hospital he was found to have a temperature of 40.2°C . [104.4°F .], appeared only moderately ill, and had only a trace of albumin in the urine. After a week's illness the temperature had fallen to normal. Agglutination tests of the patient's serum to typhoid and paratyphoid proved negative, but so also did the agglutination-lysis test with spirochaetes of Weil's disease. It was not until the 11th day of illness that this latter test became positive with a titre of 1-2,500. Intra-peritoneal injection of 4 cc. urine in a guineapig gave rise to an infection, with spirochaetes in the peritoneal fluid and blood. Later still the agglutination-lysis test showed the very high titre of 1-50,000 although there had been no relapse. The spirochete isolated was very virulent and showed certain antigenic peculiarities in the reaction of guineapig's sera inoculated with it. These pointed to the distinct separation of the agglutination and lysis phenomena in serum tests. Lysis appeared in the inoculated guineapigs before agglutination. When, with further inoculation, the agglutination of spirochaetes did make its appearance it was in the lower dilutions of serum only, while the lysis occurred with the higher dilutions. It is therefore advisable in such a test not to be content with low dilutions of serum, but to carry it out with both low and high dilutions. The test is a microscopical one with dark field illuminations.

W. F. Harvey.

SLOT (J. A.). Leptospirosen in het district Belinjoe (Banka). [**Leptospirosis in Banka.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1929. Dec. 1. Vol. 69. No. 12. pp. 1211-1215. With 1 plate. [3 refs.]

The author quotes one certain case (in a European) and 3 possible cases (in Chinese) of Weil's disease, which occurred in the tin mining district of Banka, and from this (rather limited) material deduces the possibility that the disease might be transmitted in another way than by infected water (bathing water in Sumatra, open canals in Holland). On Banka transmission by water is said to be unlikely, because: (1) surface water often contains free organic acids; (2) common bathing places are used by groups of 40-500 labourers without any epidemic spread of the disease which, according to the author, should occur; (3) apparently only few rats are carriers of the leptospira (48 examined with negative results).

W. J. Bais.

PIZA (José de Toledo) & GOMES (Luiz de Salles). Molestia de Weil em S. Paulo (Nota previa). [**Weil's Disease in S. Paulo.**]—*Ann. Paulist. Med. e Cirurg.* 1930. Feb. Vol. 21. No. 2. pp. 23-32. With 2 plates. [2 refs.]

A Brazilian, 18 years of age, was sent to hospital on the fourth day of illness diagnosed as typhoid fever, complaining of headache, shivering and general pains. Slight jaundice was noticed, and on the next day blood was withdrawn for inoculation of guineapigs for leptospiral infection and the Costa Cruz reaction for yellow fever. The jaundice increased and the patient became delirious and prostrated; he rallied a few days later, and made a complete recovery. No leptospira was found in the urine. Seven guineapigs in all were inoculated, the first with the blood of the patient, the others each with blood from the preceding. The first died in five

days and leptospira were found in the kidneys and in those of the fifth also, but none in the others although the fifth had been injected with blood from the fourth. Culture of the heart blood in Noguchi's medium gave no result. The Costa Cruz reaction was negative, as was haemoculture for *Bact. typhosum*. [This case affords confirmatory evidence of the liability of confusing Weil's disease with yellow fever during an epidemic of the latter.]

H. Harold Scott.

CATTANEO (Luigi). Contributo alla conoscenza della spirochetosi ittero-emorragica in provincia di Pavia. [**A Case of Leptospirosis icterohaemorrhagiae in Pavia.**]—*Riforma Med.* 1929. Nov. 9. Vol. 45. No. 45. pp. 1513-1514, 1517. With 2 text figs. [17 refs.] [Inst. of Med. Path., Univ., Padua.]

An interesting case is here recorded of a man of 25 years, who killed a large rat, and just afterwards trod in the blood of the animal. He had an abrasion of the foot. Two days later he began to suffer with headache, rise of temperature and general pains. Typhoid was suspected, but blood-culture and agglutination tried on the seventh day were both negative. Jaundice now appeared, and a fresh sample of blood was taken and inoculated into a guineapig. The animal died in ten days, presenting a typical picture of leptospira infection and dark ground examination as well as silver preparations revealed the organism in large numbers. Injected into a second animal, this caused death in six days. The patient's temperature came to normal in the fifth week, the jaundice persisting for another fortnight. Recovery was then uninterrupted.

H. Harold Scott.

ZIMMERMANN (E.). Diagnostik, Therapie und Fragen der Epidemiologie der Weilschen Krankheit. [**Diagnostic, Therapeutic and Epidemiological Problems of Weil's Disease.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 267-272 (351-356). [Hyg. Inst., Univ., Freiburg i.B.]

A general account of these questions. With reference to the epidemiology of the disease, the author describes two experiments in which attempts were made to infect guineapigs with water spirochaetes, of the Freiburg and Leiden strains, respectively. The first experiment with 7 guineapigs gave negative results, but in the second, 10 guineapigs were inoculated on three successive days with 6-7 cc. of a rich culture of water spirochaetes. Cultures were made from the heart blood every day for 3 weeks, but only in one instance were spirochaetes found, and then only on the day following the inoculation. Cultures of this recovered spirochaete were inoculated into 10 more guineapigs but with negative results. In the neighbourhood of Freiburg, spirochaetes were found in 13 out of 21 samples of water; also about 10 per cent. of the rats were infected with the organism. The relative importance of the two in the epidemiology of Weil's disease is not easy to decide. In the discussion UHLENHUTH pointed out, that possibly owing to climatic conditions in Europe, it was difficult to produce infection with water spirochaetes. On the other hand, a considerable percentage of rats harboured spirochaetes in a virulent form, and probably spread the infection.

E. H.

ZUELZER (Margarete). Beiträge zur Weilfrage. [**The Problem of Weil's Disease.**—*Arch. f. Hyg. u. Bakt.* 1930. Jan.-Feb.-Mar. Vol. 103. No. 1-3. pp. 282-297. [41 refs.]

After a discussion of some of the arguments that have been advanced against the author's view that all pathogenic strains of leptospira are derived from the saprophytic water form, Zuelzer describes some very interesting experiments on this subject.

Young guineapigs, weighing about 150 gm., were inoculated on three successive days with 7 cc. of a pure culture of a Heyden strain of water leptospira. Two days after the last inoculation and on successive days, 0.2 cc. of blood was removed from each animal by heart puncture and cultures from the blood examined for three weeks or longer. Out of 60 guineapigs inoculated with these water leptospira, only one showed organisms in its blood, in a culture of heart blood collected 10 days after the last injection. These leptospira of the first passage were similarly inoculated into 45 other guineapigs of which 3 became infected, all on the 15th day. After this second passage the strain was lost owing to an epidemic among the guineapigs.

It is interesting to note that the serological properties of the spirochaete changed after passage through the guineapigs. An antiserum that agglutinated the original water strain in dilutions of 1 : 10,000 agglutinated the spirochaetes of the first passage in 1 : 300 dilutions only, and had still less effect on those of the second passage. The serum of the first passage guineapig showed a slight formation of antibodies, as it agglutinated the water strain in dilutions of 1 : 50, and the first passage strain in 1 : 100. The sera of the three guineapigs of the second passage no longer had any action on the original water strain spirochaetes, but only on those of the second passage. The serum of one of these guineapigs also had a slight action on the first passage spirochaetes.

Finally, the author discusses the general affinities of water spirochaetes with the pathogenic strains and points out that both can be divided into various serological types. Various names have been applied to pathogenic strains such as *S. hebdomadis*, *S. pyrogenes*, *S. akiyami*, etc., but the available evidence supports the view that they are all varieties of the ubiquitous water leptospira which, under exceptional circumstances, may acquire the power of living in the bodies of animals, and at the same time acquire different serological properties.

E. H.

BASILEWSKY (B. G.). Ueber die Kiewer Wasserspirochäten vom Typus der *Sp. ictero-haemorrhagiae*. [**Kiev Water Spirochaetes of the Type *Sp. ictero-haemorrhagiae*.**—*Zent. f. Bakt. I. Abt. Orig.* 1930. Mar. 28. Vol. 116. No. 2/3. pp. 173-179. [12 refs.] [Inst. of Hyg. & Bact., Kiev.]

The author cultured 24 samples of water from various sources in and around Kiev and found all except two contained leptospira. Five of these strains were examined serologically and also compared with Schüffner's Krommenie strain and the Erlangen-Angerer strain. Agglutination, lysis, culture in the presence of immune serum and the adhesion test were used for the comparison of these strains, and all the Kiev spirochaete were distinct from the other two, from Holland and Berlin respectively. The Kiev spirochetes, however, differed amongst themselves, for four of the strains belonged to three serologically distinct types and in addition two distinct types were obtained from the same source, namely the town water

supply. [The existence of such differences in the water leptospiras suggests that similar serological differences may occur in the parasitic forms.]

E. H.

BESSEMANS (A.) & THIRY (U.). Les leptospires aquicoles isolés en Flandre orientale et la leptospirose spontanée de la souris. [**Water Leptospiras isolated in Eastern Flanders and Spontaneous Leptospirosis of the Mouse.**—*C.R. Soc. Biol.* 1930. Feb. 21. Vol. 103. No. 7. pp. 519-521. [3 refs.] [Inst. of Hyg. & Bact., Univ., Ghent.]

Further observations on this infection [*ante*, p. 125] show that it is very pathogenic to mice since all the animals died 5 to 12 months after becoming infected and all showed leptospira in the urine until death. The organisms were obtained in pure culture from the kidneys of these mice, by culturing in either filtered tap-water or in Vervoort's medium containing 10 per cent. rabbit's sérum. In the latter medium, inoculated with pieces of infected kidney, the culture showed 30 leptospira per field on the third day, with maximum growth on the fifth day. In filtered water development was only evident after one month, the maximum was reached after two months, and the organisms persisted for three months or longer. Subcultures were easily obtained in Vervoort's medium containing 10 per cent. fresh rabbit or horse serum, or ascitic fluid. If mixed with bacteria the leptospira were easily isolated in pure culture by filtration through a Chamberland L2 porcelain filter.

The leptospira are said to be finer and shorter in the mouse, but become thicker and longer when grown in cultures.

E. H.

STEFANOPOULO (G.) & HOSOYA (S.). Recherches sur les spirochètes icterogènes. Les spirochètes du "Akiyami" ou "fièvre d'automne" du Japon. [**Researches on Icterogenic Spirochaetes. The Spirochaetes of Akiyami or "Autumn Fever" in Japan.**—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 923-937. With 7 figs. (2 on 1 plate). [9 refs.] [Pasteur Inst., & Imperial Inst. for Infectious Diseases, Tokyo.]

A useful summary of previous work on the spirochaetes of "Autumn Fever" in Japan, together with an account of original observations. The authors confirm the view that the spirochaetes obtained from patients infected with this disease belong to two distinct types, *S. autumnalis* A and *S. autumnalis* B, which differ not only in their immunological reactions, but also in their pathogenicity for guineapigs. The spirochaetes of type A are extremely virulent, and closely resemble *Spirochaeta icterohaemorrhagiae*, whilst those of type B have a very low virulence, and closely resemble *S. hebdomadis*. A strain of *S. autumnalis* A, which when first isolated, was feebly agglutinated by an anti-*icterohaemorrhagiae* serum, became much more susceptible to the action of this serum, after having been kept in the laboratory for some months. This observation supports the view that the serological characters of strains of these spirochaetes kept in laboratory animals, are liable to change.

With reference to the treatment of this disease, various drugs were tested in guineapigs infected with *S. autumnalis* A, but the only effective compounds were bismuth salts and especially sodium tartro-bismuthate.

E. H.

KOUWENAAR (W.) & WOLFF (J. W.). Honden als dragers van leptospira. (Voorloopige mededeeling.) [**Dogs as Carriers of Leptospira.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. Jan. 25. 74th Year. 1st Half. No. 4. pp. 376-380. With 1 plate. [16 refs.] [Path. Lab., Medan, Sumatra.]

Two affections of dogs have in recent years been described in which spirochaetes were found in the kidneys. These are "canine typhoid" with uraemic symptoms and "infective jaundice," which closely resembles Weil's disease. The authors have examined 106 dogs, suffering from no apparent disease, for leptospira carriers; some of these might possibly have suffered from a slight infection and become carriers thereafter. The urine, which was examined by dark field illumination, was not once positive. Suspensions of liver examined microscopically and culturally, were all negative. Cultures from kidneys, however, gave a positive result in 6 cases (5.7 per cent.) after 19, 19, 22, 24 and 33 days respectively. The percentage should be somewhat higher than this, for some cultures had to be rejected on account of overgrowth by contaminating organisms. In four out of the six cases spirochaetes were found after a long search in sections of the kidney tissue. They formed large clumps in the renal tubules. The virulence of the isolated strains was low for guineapigs nor was the result of intraperitoneal injection at all like that given by the leptospiras of Weil's disease. These spirochaetes are certainly not absolutely identical with those of Weil's disease. The authors in this preliminary communication simply wish to put on record the occurrence of leptospiras in clinically healthy dogs in a region where comparatively numerous cases of leptospirosis had occurred. The possibility of dogs being a source of infection for man is obviously one to be considered.

W. F. Harvey.

NIESCHULZ (Otto) & WAWO-ROENTOE (F. K.). Over experimenteele infecties van paarden met *Leptospira icterohaemorrhagiae*. [**The Infection of Horses with *Leptospira icterohaemorrhagiae*.**]—*Tijdschr. v. Diergeneesk.* 1930. Mar. 1. Vol. 57. No. 5. pp. 282-289. With 2 text figs. [10 refs.] English summary pp. 290-291.

Two young horses about 5 months old were successfully infected with Weil's disease. The first was inoculated with 12 cc. of a virulent culture and showed a typical infection with the development of lysins and agglutinins against the spirochaete. The second horse was inoculated with 130 cc. of the blood of the first one and died from the infection after 6-7 days, with typical symptoms of jaundice. The spirochaetes were found in the organs, especially the liver, and easily found in the blood and urine of both horses. The first horse became negative on the 13th day, and spirochaetes could not be found in the organs on the 22nd day when it was killed, so apparently recovered horses do not remain carriers of the infection. The serum of this horse showed lysis on the 6th day, which reached a titre of 1:100,000 on the 12th day, but had fallen to 1:25,000 on the 22nd day.

E. H.

YAWS AND SYPHILIS.

WILSON (Paul W.) & MATHIS (Maurice S.). **Epidemiology and Pathology of Yaws. A Report based on a Study of One Thousand Four Hundred and Twenty-Three Consecutive Cases in Haiti.**—*Jl. Amer. Med. Assoc.* 1930. Apr. 26. Vol. 94. No. 17. pp. 1289–1292.

A short article giving some observations made on patients who visited a travelling clinic operating in an isolated rural area of Haiti in May–July 1929. The opinion is expressed that "yaws is of much less frequent incidence as the altitude of the habitations increases above 2,500 feet," and it is believed that though greater density of population may be a factor, the chief factor in transmission is a small gnat *Hippelates flavipes*, found in abundance at the lower altitudes, which acts as a contaminative vector. In 67 per cent. the primary lesion was considered to have been on the lower extremity.

The commonest symptom for which relief was sought was rheumatic pain (47 per cent.), next, crab yaw or plantar keratosis (23 per cent.); 7 per cent. only were secondary eruption cases and another 7 per cent. showed primary lesion only; chronic ulcer (6 per cent.), periostitis and osteitis (5 per cent.): in under $\frac{1}{2}$ per cent. onychia, dactylitis, saddle-nose, sabre-shin, juxta-articular nodules, gangosa, goundou. In 5 cases a diastolic aortic murmur was heard, in 4 cases hemiplegia was seen, in 4 interstitial keratitis, in 4 mucous patches, in 2 aortic aneurysm, but it is not quite clear whether these cases are considered to have a framboesial etiology.

[Some of these cases appear very doubtful, as do others quoted under the heading "of possible hereditary origin"; one a female infant aged 14 months with aneurysm of the right carotid, no history or other evidence of yaws in the child but the father had had a primary yaw at the age of 18. A second child had had bilateral ptosis since birth—he had not had yaws, but his mother was infected when 14 years old. A third child, whose father and mother had both had yaws, had pain and swelling in a knee. Other similar cases are cited including a boy aged 13 with Hutchinson teeth, stated never to have had yaws, but whose father had had yaws.]

Treatment adopted consisted of sulpharsphenamin intramuscularly or acetarsonone by mouth (three treatments in consecutive weeks for adults, 1 tablet 0.25 gm. in water 4 times a day). Results were satisfactory, but no details are given.

The authors add, as has been reported before from Haiti, that yaws is a rural disease; anyone with florid yaws is banned from the towns while cases of syphilis go unmolested. They have only seen in many years experience a single case of syphilis in a person with evidence of previous yaws infection and they believe yaws confers an immunity to syphilis. They here state that hemiplegia and aortitis, etc., may be due to yaws, that the disease is occasionally hereditary and that the mucous membrane of mouth and pharynx may be affected.

H. S. Stannus.

CHOISSER (R. M.). **Pathology in the Tropics. A Study based on the Review of 700 Consecutive Autopsies in Haiti.**—*U.S. Nav. Med. Bull.* 1929. July–Oct. Vol. 27. Nos. 3–4. pp. 551–568. With 15 figs. on 8 plates.

A section of this article, based on the findings in 700 necropsies during three years, is devoted to yaws. 90 per cent. of bodies showed signs of treponematosiis in the arterial system though yaws-syphilis ranked low as a cause of death. The bodies came from a population which when attending dispensary practice yields 60 per cent. positive serum reactions.

These cases coming to post-mortem examination gave a clinical history of syphilis or yaws in 65 per cent. Disregarding the large proportion in which the history was conflicting on the question of yaws or syphilis, the author believed that in 10 there was a definite history of yaws and none of syphilis. Of these 8 were cases of aortic aneurysm, 1 gumma of brain, 1 cerebral haemorrhage. The pathological processes found in these selected cases could not be differentiated from those found in the rest of the 90 per cent. of bodies, cases in which the non-committal diagnosis of trepanematosiis was made.

Diagnosis of treponema infection was based on lesions found in the cardio-vascular system, the earliest changes being a degeneration of the intima of the aorta with scarring and associated fatty changes beginning some 5 mm. above the valve and spreading to the transverse portion of the arch, followed later by extensive atheromatous degeneration and in some cases ulceration. In one case of severe "yaws aortitis," the intima and media were detached in long strips. In late yaws aortic aneurysm is not uncommon. Valves are practically never affected. Opalescent patches were noted on epicardium and endocardium while the myocardium was usually thin and flabby, but rarely showed fibrosis.

In the present series of cases there were 4 cases of cerebral haemorrhage all in young adults with a history of yaws.

The liver in cases of old and untreated yaws frequently shows small superficial punctate scars which on section show degeneration and circumscribed round-celled infiltration. A case of gumma of the liver and one of gumma of brain were also seen in cases which had given a negative history of syphilis, but admitted yaws. No case of tabes was observed.

[It is I think just worth while to examine these figures again: 630 (90 per cent.) of the total 700 bodies showed evidence of treponematosiis—the evidence being "irregular linear scars and atheromatous plaques" . . . "a degeneration of the intima with resulting scars associated with fatty changes." "extensive atheromatous degeneration," aneurysm. These changes suggest rather those of what in England we call atheroma, a condition beginning in the intima and in which syphilis plays no part. Syphilitic aortitis is a mesaortitis: the essential changes are in the media followed by a fibrosis causing contraction with the production of linear and stellate scars. It is therefore essential, it is suggested, that the author give a more precise and detailed account of the histopathological changes in the lesions he has mentioned before yaws and syphilis as etiological factors can be accepted.

Again of the 630 cases only in 10 was the author satisfied that yaws could be asserted as the cause to the exclusion of syphilis and this on the past history. When difficulty existed in 63 out of every 64 cases it is suggested that complete reliance cannot be placed on the history in the odd one case.]

H. S. S.

DA MATTA (Alfredo Augusto). Conclusões em torno de 600 casos de boubá. [**Six Hundred Cases of Yaws.**]—*Sciencia Med.* 1929. Dec. Vol. 7. No. 12. pp. 591–603. With 12 figs. on 6 plates. [47 refs.] [Oswaldo Cruz Dispensary & Pasteur Inst., Manaus.]

In his introductory paragraphs Dr. da Matta divides the treponema infections into: (a) the treponematoses of the skin and mucous membranes [!]*—yaws—a disease of tropical countries—markedly contagious but not hereditary and not giving rise to tertiary lesions, easily treated;* (b) the treponematoses of the blood and viscera [skin not mentioned!]*—syphilis—world-wide distribution, hereditary, and commonly followed by tertiary lesions, resistant to treatment.* Next the history of the introduction into Brazil is mentioned and the etiopathogeny and symptomatology dealt with. While admitting a variety of cutaneous manifestations as due to yaws the author has never seen any of the ulcerative lesions of skin and bone, osteitis, etc., goundou or gangosa commonly ascribed to this disease by many other authors.

H. S. S.

MUKHARJI (B. C.). **Framboesia Tropica in Bengal.**—*Indian Med. Gaz.* 1930. Jan. Vol. 65. No. 1. pp. 10–11.

A disease locally known as *myang* was reported in February, 1927 among natives of the Chittagong Hill Tracts and was later in the year diagnosed as yaws. In discussing this disease the following statements are made:—

“The primary lesions may appear as an ulcer or as a papule, which soon breaks into an ulcer. Primary ulcers have been found on the genitalia but they may be extra-genital . . . The papules appear on the skin and break down, forming ulcers with clean-cut edges and granulating bases. In some cases the papules grow into small warty tumours which break down and form unhealthy looking weeping ulcers with clean cut edges . . . Warty growths have been noticed in the anus.”

[Such a description is not that of yaws as commonly seen and it is suggested needs confirmation by someone well acquainted with yaws or some modification in the use of terms. Such a statement as that in relation to the anus is most misleading.] It is believed that the disease was introduced some 15 years ago by Burmese labourers who were engaged in the district in building an elephant trap; hence the word *myang* (=an elephant).

H. S. S.

LAMBERT (S. M.). **Yaws in the South Pacific.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 429–437.

The South Pacific differs from most other framboesial centres of the world, the author points out, in that syphilis is almost unknown. He bases this statement upon the fact that apart from a single Fijian who acquired syphilis from an Indian woman he has never seen a primary chancre or the scar resulting from a chancre, among many thousands of natives examined during many years. With the exception of two other cases under special conditions the author says he has never found any medical man in the South Pacific who has seen syphilis among the natives, though the disease is extremely prevalent among the Indian

population in Fiji and Asiatics in other groups. Yaws clinically in the earlier stages runs a course similar to that seen elsewhere, but note is made that among older children and adults certain other lesions are common and accounted for 329 of 1,825 admissions to the Colonial Hospital and 2,167 of 8,819 admissions to provincial hospitals. Among these, a condition is described rather like a rapidly spreading lupus, a multiple gummatous ulceration of skin spreading peripherally while healing in the centre, occurring on face, limbs, back or chest. In others, the ulceration spreads by an advancing raised edge of ulceration. Both varieties also attack the mucous membrane of the nose, palate, pharynx and septum with tissue destruction.

Periosteal thickenings on long bones are also common while nodules like those in the skin are found in the bones, particularly in the sternum and calvarium. Large indurated masses occur in muscles and a nodule was seen in a man's tongue; these clear up quickly with potassium iodide.

Aneurysm and aortic disease are not uncommon diseases among Fijians. Cases of paraplegia and of persons with signs of cerebral tumour responding to iodides and arsenical compounds are not infrequent. Of 182 admissions to the local asylum, Fijian natives, Melanesian and Polynesian none of whom have had syphilis, 42 have died of G.P.I. [Observations which are similar to those of other writers upon yaws in the South Pacific, but which are not accepted by all those interested in the disease.]

In dealing with treatment Dr. Lambert believes that the reservoir of infection lies among youths who have a history of yaws, but who show no signs or symptoms of the disease, and that an anti-yaws campaign must provide mass treatments of the youth up to the age of seventeen.

H. S. S.

TIROUVANZIAM. Le pian, maladie endémique. [**Endemic Yaws.**].—*Bull. Soc. Méd.-Chirurg. Indochine*. 1929. June. Vol. 7. No. 6. pp. 317-320. With 1 text fig.

Yaws is widely spread in Cambodia, especially in the forest region. It is considered one of the inevitable diseases of childhood, and the disease in the secondary stage is allowed to run its course for several months before treatment with sulphate of copper is begun. Any further aid is only sought when more disabling lesions occur. These are as met with in other countries and include gangosa, etc.

H. S. S.

LEON (Rulx). **Hereditary Yaws.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 439-443. [7 refs.]

Yaws, according to most authorities, has been considered a non-hereditary disease. On the other hand, HUNT and JOHNSTON, in a study of 2,000 cases of yaws in natives of Samoa among whom syphilis is said not to occur, found cases of parenchymatous keratitis and concluded that this affection was due to inherited yaws. The present author therefore thought it would be worth while to apply what he calls "the obstetrical method" in a search for heredo-yaws as is done in searching for heredo-syphilis.

In a series of 225 deliveries systematic search was made in the mothers for the existence of syphilis or yaws, and the possible transmission to the

children. The diagnosis of yaws in the mother rested on her own statement; "in the presence of a positive Kahn reaction, when there is no history of yaws it is usually safe to assume that syphilis exists."

The other factors noted beside the Kahn reaction of mother and child were "presence of hypertrophy of the placenta, abortions, and babies born dead or macerated."

The following table has been made from the figures given by the author.

	No history or evidence of yaws or syphilis.	Cases considered to be syphilis.	Mothers con- sidered to have positive yaws history.
Mothers	50	124	40
Kahn Test Mother ...	Neg. 98%	Pos. 67%	Pos. 97%
Kahn Test Baby ...	—	„ 60%	„ 50%
Hypertrophy of Placenta	34%	58%	63%
Children born dead...	—	14%	(1 case =) 2.5%
Macerated foetus ...	—	10%	—
Abortion	—	2 cases.	2 cases.

A statement is then made that "Interstitial keratitis was found twice among the children of the syphilitic mothers, but never among the children of yaws mothers. The fetal liver and the placenta was examined histologically in 17 cases without finding spirochaetes." The author finds that by this method of investigation somewhat similar results are obtained in a group of yaws cases as in a group of syphilitic cases. [The fallacies are so obvious that they do not need mention.]

H. S. S.

WILSON (P. W.). **The Frontal Attack on Yaws—a Plea for a Change in Strategy.**—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 1-5.

A short address read before the third annual congress of the Haitian Medical Society in April, 1929, entering a plea for a regular campaign against yaws. Local conditions demand travelling units to do the work and in an editorial note it is stated that a beginning has been made along these lines. As to medicinal treatment the author says: "It is believed that in the treatment of yaws in the infectious stage the bismuth treatment should be abandoned, sulpharsphenamine or stovarsol given in its stead, and a second treatment of stovarsol delivered to the patient which he would be instructed to take a week later."

H. S. S.

SHIRCORE (J. O.). **A Note on Certain Aspects of the Epidemiology and Morbidity of Yaws. With Special Reference to Fat Metabolism.**—*Lancet.* 1930. May 3. pp. 960-961.

Dr. Shircore sums up this note in his last paragraph as follows:—

"It would appear from the above data that low dietetic values, in particular the scarcity of animal protein, and the almost entire absence of fat, milk, calcium, and fat-soluble A, which are intimately associated with

calcium metabolism, are the distinctive factors which play an important part in the morbidity and epidemiology of yaws. And when yaws obtains a hold on the human organism and is untreated, one might well speculate whether the late tertiary manifestations, the osteoporotic lesions, may not be a result of the breaking down of calcium reserve, by an interference of *S. pertenuis* with fat metabolism and the activity of fat-soluble A, in the circumstances mentioned."

H. S. S.

Fox (Howard). **Yaws (*Frambesia Tropica*) as observed in Haiti.**—*Arch. Dermat. & Syph.* 1929. Dec. Vol. 20. No. 6. pp. 820–833. With 8 text figs. [14 refs.]

Dr. Howard Fox relates his observations on yaws seen while on a visit to Haiti; only a single case, a woman from the West Indies, having been under his care before. On the clinical side there is nothing new to chronicle but two important statements, coming as they do from one well versed in the manifestations of syphilis among negroes, may be quoted. "The characteristic early granulomatous eruption of yaws was unlike any manifestation of syphilis that I had ever seen in negroes" [the reviewer has always tried to maintain this point in spite of the publication of so-called framboesiform syphilides]. No case with involvement of mucous membrane was seen among the yaws cases and "in no case did I see anything resembling the ordinary macular eruption (roseola) of early syphilis." The annular papular syphilide, so common in negroes as to constitute a racial peculiarity, was not seen in these cases of yaws; in only two cases was there a condition in any way bearing resemblance to it. There was no evidence of the disease being congenital. Tissue from two cases of secondary and two cases of tertiary yaws was excised and examined by Dr. W. H. HIGHMAN. Recent histological examinations in yaws are so few that his findings and Dr. Fox's comments are quoted below in full.

"Under low power magnification, the striking feature was the enlargement of the papillae, prevailing in all diameters. There was a corresponding modification of the contour of the epidermis. In some places the pegs were wide and long, and in others narrow. They fused, cutting off the papillae as islands. In the epidermis were collections of pus cells (small abscesses). The papillae, whether snared off or not, and the upper half of the corium proper contained an infiltration that was sharply limited below in a roughly horizontal line. Within the confines of the infiltration, the veins were engorged. The collagen fibers in the papillae were separated by edema. High power magnification showed that the epidermis was crusted. Many of the rete cells were vacuolated. There was a tendency to edema in and among the rete cells. A marked tendency to hyperkeratosis was found. The miliary abscesses contained pus cells. The infiltration was composed chiefly of plasma cells less densely grouped in the papillae than in the corium, where they suggested a mosaic inlay. In one section, giant cells were found, in another the vascular changes roughly suggested syphilis, but in all the intima and media were swollen. No productive inflammation, however, was found in the vessels as in syphilis.

"Comment: The changes in the epidermis were merely what is found in all proliferating infective granulomas. Schamberg and Klauder and Schüffner demonstrated *Spirochaeta pertenuis* in the abscesses. Blastomycetes and sporotricha are similarly situated in the respective lesions which they occasion. The infiltration in yaws is characteristic in that it is horizontally delimited below and is a plasmoma. All authors agree on this point except White and Tyzzer, who found no plasma cells. Giant cells

are rare. The vascular changes are unlike those in syphilis. The infiltration is not subdivided into tubercles and is not intimately related to productively inflamed blood vessels, as in syphilis. It lacks the giant cells of tuberculosis, and numerically its plasma cells exceed those of syphilis. Moreover, the plasma cells seem more succulent and larger than those in syphilis.

"Dr. Highman concluded that the lesion of yaws was an edematous verrucous plasma.".

Skiagraphic examination was made of a case in which there was a sabre like protrusion of the middle of the tibia on which was a large fungating hemispherical swelling of the soft parts.

"A roentgenogram was submitted to Dr. L. T. LeWald and Dr. Gustav Bucky of New York, who stated that the changes in the bone were unusual, but were not, in their opinion, syphilitic. The roentgenogram showed a tumor of the tibia originating from the bone marrow and causing a protrusion of the cortex which was markedly thickened but not interrupted. No proliferative periostitis (calcification) could be detected. The thickened cortex suggested syphilis, but the apparently intact periosteum and the protrusion from the marrow were against this diagnosis."

H. S. S.

MIYAO (Isao). **Yaws Lesions on Mucous Membranes and a Report of Two Cases of Genital Manifestations of *Framboesia Tropica*; an Instance of Genital Transmission of Yaws.**—*Philippine Jl. Sci.* 1930. Jan. Vol. 41. No. 1. pp. 13-23. With 7 plates & 1 fig. [7 refs.]

Lieutenant Surgeon Miyao publishes his observations as indicated in the title of this paper because, he states, very little information is given in textbooks upon these points.

In short, a Japanese male suffering from yaws with secondary lesions on the glans penis infected his wife, who developed early lesions about the vulva. [Genital lesions are well recognized though uncommon, and the same is true of genital infection.] The second point, namely yaws lesions on mucous membranes, which the author deals with requires careful consideration. In the man he says "one lesion located in the neighborhood of the left corner of the mouth extended onto the mucous membrane of the lip. . . . Around the anus a wide condylomalike moist lesion covered with oozing lymph and pus was found," etc. There was a lesion on the penis extending on to the prepuce and glans involving the frenulum and the adjacent part of the orifice of the urethra. Later he states, "the lesions on the mucous membranes, that is to say, the lip, anus, and glans penis, remained unchanged." [Lieut. Miyao does not appear to recognize that the glans penis is covered with skin not mucous membrane, and that the lesions around the anus are always in connexion with skin, and the same is probably true of those lesions commonly situated at the muco-cutaneous junction of the mouth and nostril. It is possible that secondary framboesial lesions may develop on mucous membranes, but very few such true lesions have been recorded, if any; those that have been observed have been possibly the result of a creeping lesion from skin on to mucous membrane with healing taking place at the tail end.]

In the case of the woman the two earliest lesions were situated "on right labium majus" followed by others, one "at the introitus of the anterior vaginal wall below the orifice of the urethra . . . one was located between the clitoris and the urethral orifice and one in the neighbourhood of the lesion 2 on the upper part of the right labium majus." Later "one new lesion was found on the posterior wall of the introitus vagina." [These again are alluded to as lesions on mucous membranes, but with the exception

of one they were all certainly situated on the skin of the vulva as indicated by the diagram given. The one possible exception must remain uncertain as the diagram is not sufficiently clear. Most of what has been written in the past on the question of secondary yaws lesions affecting mucous membranes cannot be relied on: many such observations really refer to lesions about muco-cutaneous junctions, and some, as in the present case, depend upon the non-recognition of what is skin and what is mucous membrane. Hence the reason of this long criticism by the reviewer.]

H. S. S.

MIGUENS (J.). Le pian et son traitement par les sels insolubles de bismuth. [**Yaws and its Treatment by Insoluble Salts of Bismuth.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 211–217.

Writing from Bukama, Belgian Congo, the author, whose first communication on the treatment of yaws was made in 1924, now gives some of the results noted 18 months after a form of treatment instituted in 1927 [see this *Bulletin*, Vol. 22, p. 550]. His method consists in giving a single intramuscular injection of a 10 per cent. oily suspension of dermatol in the proportion of 1 cc. (or 0.05 of bismuth metal) per 10 kilogr. body weight. Seen 18 months later, of nearly 1,000 cases so treated, 85 per cent. showed clinical cure. The remaining 15 per cent. he suggests are accounted for by the inclusion in the original number of some old chronic cases, some of which are bismuth-resistant and possibly a few cases of reinfections.

These results prove the value of this form of treatment—single massive doses of insoluble salts of bismuth, though, as the author points out, the results are merely clinical and not controlled by W.R. and the ultimate result is unknown.

[It would be most instructive if this group of cases could be kept under observation during the next few years, or longer if possible, to see if recrudescences or late manifestations do occur, also if a W.R. could be done on each of these apparently cured cases at some future time.]

H. S. S.

MATTLET (G.). Traitement du pian par le dermatol. [**Treatment of Yaws by Dermatol.**]—*Bull. Méd. du Katanga.* 1929. Vol. 6. No. 1. pp. 26–29.

Since this author's first note on the use of dermatol it has been used continuously at Kitega. For florid yaws in the adult N.A.B. may be preferable, but for the cases with rheumatic and bone pain, ulcerative and other late manifestations, the bismuth preparation is better. The product furnished by Meister Lucius and Bruning, containing 50 per cent. bismuth metal, is found to be much safer than commercial dermatol. The approximate weight of the patient in kilos divided by 20 expressed as c. centimetres is the dose of a 3 per cent. oily suspension (prepared after the method of Yernaux) for an adult given intramuscularly at weekly intervals. Latterly, to obviate some of the difficulties and dangers met with when using the oily suspension, tragacanth has been substituted in 5 per cent. solution, to which is added 2–3 per cent. urethane.

H. S. S.

- GOLD COAST. **On the Use of Bismuth and Arsenic Compounds in the Treatment of Yaws and Syphilis.**—*Gold Coast Rep. on Med. & San. Dept. for Year 1928-1929.* Appendix F. pp. 132-133.
- **Report on the Yaws Clinic** by Dr. A. J. Hawe, Medical Officer [O'BRIEN (A. J. R.), Resident Medical Officer].—*Ibid.* Appendix G. pp. 133-138.

In appendix F a summary of opinions by Medical Officers on the relative value of bismuth (sodium bismuth tartrate) and arsenic (N.A.B.) in the treatment of yaws is given [with no statistics]. Bismuth preparations are cheap and easily administered and untoward reactions are uncommon except stomatitis, which responds readily to treatment. Skin lesions of secondary stage respond quickly and patients are rendered non-infective early, but up to twelve weekly injections were needed to produce freedom from symptoms for any length of time, and it is held that bismuth alone is insufficient to "cure" yaws. N.A.B. is considered far superior, but cost is its great disadvantage. [One point, possibly of great importance in regard to effecting actual cure, namely, the length of time the secondary eruption has existed before treatment is commenced, is not referred to.]

Appendix G is a report from the Yaws Clinic dealing with 550 patients treated in the year 1928-29, of whom 81 only completed 3 courses of treatment each of a total 10 grains of "sobita." The results so far as causing the disappearance of the secondary rash were good, but doubt is expressed as to the curative value of bismuth. In tertiary framboesial lesions bismuth was disappointing, but with N.A.B. good results were obtained in ulceration, periostitis and gangosa. Of a total of 81 cases which received at least one course of treatment, the W.R. remained unaltered (positive) in 67.9 per cent., improved in 32.1 per cent., single plus changed to negative 3.7 per cent., double plus changed to negative 4.9 per cent.

H. S. S.

- M'ALEER (T. B.). **The Treatment of Yaws with "Bivatol" in Benin, Nigeria.**—*West African Med. Jl.* Lagos. 1930. Jan. Vol. 3. No. 3. pp. 59-61.

A short note on eleven cases treated with LEVADITI's bivatoil (a bismuth salt in oil). Three intramuscular injections are given in the first week and thereafter two per week, a course being up to fifteen injections to "cure" [? clinical cure]. The results were considered to be satisfactory.

H. S. S.

- PUFF (Gerhard). Beitrag zur Behandlung der Framboesie. [**Treatment of Yaws.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. July. Vol. 33. No. 7. pp. 388-392. With 1 text fig. [5 refs.]

Working at a Mission hospital among the Wachagga in the Kilimanjaro area, the author describes some of the conditions met with and ascribed to yaws with special reference to treatment by calomel "diasporal" and bismuth "diasporal."* Mention is made of a case

* Prepared by "Firma Chemisches Werk, Dr. Klopfer."

of deep punched-out ulceration of the tonsil and adjoining parts which responded quickly to the former preparation, and a second case of a similar condition affecting the lip cured by calomel diasporal and N.A.B. A monarthrititis of knee, ankle, elbow or wrist is common and easily treated by the exhibition of mercury, especially in the form above mentioned. Reference is also made to bone pain as a common symptom and to keratosis of hands and feet, and framboesial affections of the liver and other internal organs the author also suspects to exist, but without any evidence. The statement is made that because the conditions mentioned above do well under mercury and N.A.B. he considers them to be cases of yaws. [One is tempted to think that many of the cases on the contrary may have been syphilis.] The rest of the paper contributes support to the efficacy of the two diasporal preparations in tertiary yaws [or syphilis].

H. S. S.

TODD (K. Waller). **Halarsol and Yaws. Two Further Series of Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 201–202. [Hosp. of Baptist Missionary Soc., Yakusu, Upper Belgian Congo.]

A previous article by this author and Dr. C. C. CHESTERMAN on the same subject has already received notice in this *Bulletin* [Vol. 25, p. 659]. The evidence obtained in the present series of 69 cases goes to show that a standard treatment of 2 cc. of a 2·5 per cent. solution intravenously repeated once after three or four days “whitens” or yields an apparent clinical cure in secondary yaws in the adult. Weekly doses are effective if repeated for longer periods in tertiary cases. Halarsol is without action when given by mouth. The minimal toxic dose is about 4·5 mgm. per kgm. It has no curative action in trypanosomiasis.

H. S. S.

- i. TANABE (B.). **Note on the Duration of Immunity to Yaws in Philippine Monkeys.**—*Philippine Jl. Sci.* 1929. Sept. Vol. 40. No. 1. pp. 49–51. [4 refs.]
- ii. SCHÖBL (Otto). **Serologic Studies in Experimental Yaws.**—*Ibid.* pp. 53–56. [4 refs.]
- iii. — & TANABE (Bunshiro). **Experiments concerning the Yaws Antigen which produces Positive Wassermann Reaction when injected in Suitable Experimental Animals.**—*Ibid.* pp. 57–69. With 1 text fig. [6 refs.]
- iv. MIYAO (Isao). **Is the Wassermann Reaction provoked in Philippine Monkeys by Yaws Vaccination Specific.**—*Ibid.* pp. 71–74.
- v. —. **Following the Subcutaneous Immunization with Yaws Vaccine is the Skin Tissue proper Responsible for the Production of Wassermann Reagin or do Other Tissues also participate?**—*Ibid.* pp. 75–78. [1 ref.]
- vi. GARCIA (Onofre). **The Relation of the Wassermann and the Kahn Reactions with Regard to Treponema Antigen.**—*Ibid.* pp. 79–87. [2 refs.]
- vii. SCHÖBL (Otto). **Summary of Serologic Studies in Experimental Yaws.**—*Ibid.* pp. 89–90.
- viii. — & MIYAO (Isao). **Immunologic Relation between Yaws and Syphilis.**—*Ibid.* pp. 91–109. With 4 plates. [11 refs.]

A series of papers giving the results of further experimental work in yaws carried out by Schöbl and his colleagues at Manila in con-

tinuation of investigations which have already received notice in this *Bulletin*. All those interested in this subject should read the original papers. The seventh (vii), a summary of the six preceding, is given below *in extenso*.

i-vii. "It appears from the experiments described in the preceding papers that the reagin of the Wassermann reaction is a true antibody of its kind. It occurs in the blood not only as a result of infection with treponemas but also as a result of subcutaneous injections of killed treponemas. It is therefore a direct serologic response to the antigen contained in the treponemas and not merely a consequence of interaction between the viable treponemas and the tissues. The 'in vivo antigen' of the Wassermann reagin is a substance which can be liberated from the treponemas and which shows a high degree of thermostability and is specific. The same 'in vivo antigen' that produces positive Wassermann reaction is responsible for the appearance of other serologic reactions which are based on the phenomenon of precipitation of the 'in vitro antigen' by the serum of the tested subject (Kahn). The strength of the Wassermann reaction stands in direct proportion, but the pre-Wassermann period in inverse proportion, to the amount of the treponema antigen injected. The serologic response to repeated vaccination with killed treponemas is the same as the response to repeated infections interrupted by cures.

"Following subcutaneous vaccination the skin proper and not the lymphatic tissues or the muscles are responsible for the production of the antibody detectable by the usual serologic reactions. Intraperitoneal and intramuscular vaccination failed to produce positive serologic reactions. The serologic reactions and the antitreponematous immunity are not directly dependent on each other but are dependent on a common factor, that is the 'in vivo antigen.' Consequently these two phenomena show a certain parallelism. The strength of the Wassermann reaction in the early stage of the disease indicates the severity of the infection at that time, and therefore it indirectly prognosticates the early development of the subsequent immunity. But the immunity continues to exist after the serologic reactions have vanished. However, the infection may be so mild that no appreciable serologic change will take place, and yet immunity may set in even though delayed. If a persistent positive serologic reaction establish itself in the resistant stage of yaws following infection it may last for a long time without any apparent lesion or latent infection."

viii. Schöbl and Miyao deal with the results of experiments devised with the idea of clearing up the question which forms the title of this paper. A great deal of previous work, it is pointed out, for reasons given, is open to criticism. "The study of immunity in syphilis was stranded on the rock of *latent infection*." The main fact in the problem as previously established by Schöbl is that yaws monkeys were only found to be without exception immune to superinfection (with yaws) seven months after the primary inoculation; in other words, the minimum time limit at which monkeys can be expected to have developed a high degree of immunity to yaws is no less than 210 days. Monkeys therefore, at a twelve months' interval, and proved to be immune to yaws, were used in testing for cross immunity to syphilis, using the Nichol strain. Intradermal inoculation on the brow or scrotum of monkeys with material from syphilitic rabbit orchitis was the method adopted. The inoculation lesion so produced in control monkeys is very small and contains very few treponemata. It develops after 2-(3)-4½ weeks and disappears after a time varying to 12 weeks, leaving no sign. Such a lesion would hardly serve by which to judge of infection. A method was therefore employed whereby at varying intervals after the initial lesion had healed an emulsion of the

corresponding excised lymph glands was injected intratesticularly into rabbits. All 13 yaws-immune monkeys failed to develop syphilis, while all the control non-immune animals were infected, as demonstrated by the above method. It is held, therefore, that a high degree of immunity to yaws protects against cutaneous infection with syphilis in Philippine monkeys. That the treponema of syphilis in monkeys as in rabbits reaches the lymph glands regularly, and survives there long after the inoculation lesion has healed forms, the authors believe, a fundamental biological difference between this infection and yaws and serves as a rational explanation of the clinical differences between the two diseases.

H. S. S.

MIYAO (Isao). **An Unusual Late, Fungoid, and Ulcerative Yaws Lesion in an Experimental Monkey.**—*Philippine J. Sci.* 1930. Jan. Vol. 41. No. 1. pp. 25–29. With 3 plates. [1 ref.]

A short note recording the clinical manifestation in an experimentally infected monkey.

1926. Nov. 26, inoculated in both eyebrows from a yaws monkey. Dec. 22, primary yaw developed in each site containing treponemata. 1927, Feb. 7, treatment with neosalvarsan begun, eight injections with a total of 0.09 gram. March 5, after the second injection no sign of lesions remained, and nothing fresh developed.

1928. Feb. 15, reinoculated on both eyebrows from a yaws monkey. April 11th, inoculated a third time nothing having happened since 15.2.28. June 25–July 28, a yaw developed on left eyebrow spreading on to lid and later forming a large fungating mass which in November began to retrogress and show signs of spontaneous healing in December, no treatment having been given. "Throughout the duration of the late lesion weekly examinations were made by dark-field microscope. Treponemas were never found in the lesion."

[No explanation is offered for this clinical course and of the non-finding of the organisms in the lesion.]

H. S. S.

HASHIGUCHI. **Movability of Rabbit Frambesia.**—*Hifuka Kiyo (Arch. Dermatology)*. 1929. Apr. Vol. 13. No. 4. [Summarized in *Japan Med. World*. 1929. July 15. Vol. 9. No. 7. pp. 237–238.]

"BROWN and PEARCE maintained that there is no secondary keratitis in experimental rabbit frambesia and this point, therefore, can be taken as a differentiating point of frambesia from syphilis. On the other hand, IKEGAMI reported several cases of secondary keratitis and depilation of entire body and he said that there is no clinical distinction between frambesia-keratitis and syphilis. The author compared frambesia and syphilis histologically and clinically. Affection of nose in frambesia is comparatively rare. Only seven cases out of 84 experimented rabbits had secondary affection in nose. The nose is affected in 50 to 248 days after inoculation and reaches its maximum in 10 to 47 days and spontaneously heals in 47 to 127 days. Clinically as well as histologically the site of affection cannot be distinguished from syphilitic affection. It may be only somewhat milder. *Spirochaeta pallidula* are always found in the site."

H. S. S.

HASHIGUCHI. **Metastatic Changes in Rabbit Frambesia. Specially Clinical and Pathological Studies in Skin Eruptions.**—*Hifuka Kiyo (Arch. Dermatology)*. 1929. May. Vol. 13. No. 5. [Summarized in *Japan Med. World*. 1929. Sept. 15. Vol. 9. No. 9. p. 299.]

A note upon the secondary eruptions occurring in rabbits inoculated with yaws. They occur in 9 per cent. of animals and appear in from 40 to 114 days after inoculation, and last 22–52 days. Roseolar, papular and encrusted lesions are met with, with transitional types and desquamation, the desquamatory papular eruptions predominating. The areas affected include head, face, back, buttock, the extremities, external genitalia and tail. The histological picture in the several eruptions is similar, but varies in the degree of evolution. Infiltration with large and small mononuclear, polynuclear, plasma and connective tissue cells and histiocytes is noted, associated with various degrees of hyperaemia and oedema. The spirochaete can be demonstrated in all the eruptions except the roseola. Clinically and histologically the picture differs somewhat from that in syphilis but, it is considered, in degree only.

H.. S. S.

BUTLER (C. S.). **Relation of Syphilis and Yaws.**—*Ann. Internal Med.* 1929. Aug. Vol. 3. (Old Series Vol. 8.) No. 2. pp. 175–179.

In this lecture, delivered to students at Georgetown University Medical School, Captain Butler gives a short survey of the grounds upon which he bases his ideas of the unity of syphilis and yaws. In referring to the history of syphilis he points out how “attempts have been made by the learned . . . to place the origin of syphilis to the credit of any other race of people than that to which the particular wise man who was doing the writing about it, belonged.” It was a long time before the theory that Columbus brought the disease into Europe from the Carib Indians was discredited. Captain Butler's explanation is as follows: “It is our belief that the Portuguese infected the ‘Slave-bearing’ fringe of Africa with their venereal type of syphilis and that the 75 years of their contact with this coast through the slave trade before they began sending slaves to America [1442 to 1517] was sufficient to give the negroes Portuguese syphilis. The negroes interpreted the white-man's syphilis in terms of yaws and when the West Indian slave trade began, passed it back to him as such.” For the author—“The identity can be proven as far as it is possible to prove anything in medicine by tests and studies old and new, arranged under the following heads, any one of which might occupy from a half minute to a half day depending upon the state of ‘openness’ of the particular mind to accept facts,” etc. [For Captain Butler the problem is an easy one and settled; others appear to still keep their minds open, waiting for the evidence which experimental work now being carried on in syphilis and yaws will yield.]

H. S. S.

REASONER (Mathew A.). **Experimental Yaws and Syphilis.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 413–427. [17 refs.]

Research work commenced upon yaws in rabbits upon similar lines to that carried out with syphilis published in 1916 was interrupted by duties in connexion with the war. It is now published.

It is not possible to give in a summary the conclusions reached, nor perhaps is it necessary at this date; the paper will be read by those interested, and in it will be found in Part II reference to the findings of subsequent workers.

H. S. S.

WALRAVENS (P.) & WALKER (J.). Syphilis nerveuse chez le noir. [**Syphilis of the Nervous System in the Black.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 203-206. [Bact. Lab., Elisabethville.]

After alluding to the common belief that syphilis of the nervous system is rarely seen among black races the author gives short notes of 5 cases met with in Elisabethville diagnosed as cerebral syphilis, 3 of which were considered to be cases of G.P.I. In all trypanosomiasis was excluded; in all the C.S.F. gave a positive W.R.; albumin and lymphocytes were present.

H. S. S.

ROSSOW (A. W.). Zur Klinik und Diagnostik der Nodosités juxta-articulaires. [**Symptoms and Diagnosis of J.A.N.**]—*Arch. f. Dermat. u. Syph.* 1929. May 20. Vol. 157. No. 3. pp. 677-684. With 3 text figs. [17 refs.]

Two new cases are described in this article, bringing up the total number mentioned in Russian literature to 20. A short analysis of these 20 cases is then made. It is noted that in 18 evidence of syphilis was positive; the W.R. was positive in 15. In 15 manifestations of syphilis were present at the time the patient came under observation of the J.A.N. The nodules had been noticed for periods varying from 2½ months to 23 years. The elbow and great trochanter were the commonest sites; the number of nodules varied from 1-10. Thirteen cases had had none, the remainder insufficient, antisypilitic treatment. His own cases are then described by the author in full and the differential diagnosis is discussed.

H. S. S.

i. WELTI (Max H.). Ueber Nodositas juxta-articularis. (Nodosité juxta-articulaire Lutz-Jeanselme.) [**Juxta-Articular Nodules.**]—*Arch. f. Dermat. u. Syph.* 1930. Mar. 22. Vol. 159. No. 3. pp. 541-550. With 4 text figs. [2 pages of refs.] [Clinic for Dermat. & Syph., Univ., Vienna.]

ii. STERN (Fr.). Ueber juxtaartikuläre Knotenbildung bei Syphilitikern. —*Dermat. Woch.* 1930. May 17. Vol. 90. No. 20. pp. 677-682. With 4 text figs. [8 refs.] [Municipal Hosp., Nürnberg.]

i. The author describes what he believes to be the first case of J.A.N. recorded in Austria, that of a male aged 70, giving no history of syphilis, from whom two tumour masses in the left buttock had been removed four years previously; a diagnosis of sarcoma cutis had been made and the W.R. had been found to be positive. When seen in 1929 he presented typical J.A.N. about elbows, knees and shins, with a "tubero-serpiginous" syphilide on upper and lower limbs; the W.R.+++ . An excised node showed a typical pathological picture—portions injected intratesticularly into a guineapig produced no lesion.

ii. Two cases of J.A.N. are recorded, one in a woman of 53 with ulnar

nodes, a tubero-serpiginous syphilide of skin close by and a '+++' W.R., but no history of syphilis; the other, a male aged 35, who had a primary sore in 1919 at which time the W.R. was negative, no secondary lesions, an efficient course of treatment by mercury and arsenic followed by a negative W.R., in whom nodes appeared about the elbows 4 years ago. The right was the size of a duck's egg, the left of a hazel nut. The histological findings were characteristic; spirochaetes were not demonstrated.

H. S. S.

ALBERNAZ (Paulo Mangabeira). Contribuição ao estudo do "gundú" o "gundu" no Brasil. [**Goundou in Brazil.**—*Brasil-Médico*. 1929. Aug. 31. Vol. 43. No. 35. pp. 1040-1049. With 8 text figs. [47 refs.]]

An interesting article in which the author, after referring to previously recorded cases in Brazil, describes in detail a case of goundou in a white man, the sixth he believes to be described. [Really, I think, the seventh counting a case recently shown at the Royal Society of Medicine.] The cases previously reported in Brazil referred to four white, four coloured men, two negroes and seven unspecified: eleven were males, thirteen females, and in three the sex was not stated.

The author's case was a male white Brazilian, aged 58, who came under observation in April, 1928, with an eight years' history of a burning sensation in the eye, followed shortly after, by swelling below the inner canthus of the left eye, and later still, loss of smell and inability to breathe properly through the left nostril for about ten months. No history of local trauma. The patient states he was born with signs of "bouba" [*sic*] and that two brothers were born with similar skin manifestations which quickly cleared up. His father was said to have suffered from bouba with skin lesions, similar to those in the children. The man has seven healthy children, his wife had no miscarriages, and he himself shows no sign of syphilis. The patient shows right and left paranasal swellings arising in connexion with the nasal processes of the maxillae, and a third swelling associated with the outer aspect of the left malar bone. No other bones were obviously affected, but examination of the nasal passages showed involvement of bony nasal septum and of the arch of the palate forming the floor of the left nostril. X-ray examination confirmed these findings and excluded any lesion of the vault or base of the skull or of mandible. The W.R. is stated to be "strongly negative ++++; Meinicke reaction definitely positive +++" [I think the word negative is a mistake, as elsewhere reference is made to "a positive W.R. with four +".] The blood was normal, save for a mild leucopenia with relative lymphocytosis; the urine normal; in the faeces a few ankylostome ova.

Four pieces of tissue were excised and submitted to histological examination, the results being described in detail too long to be summarized except to say that they are considered by the author to represent an osteometaplasia, with no sign of any inflammatory reaction, a condition which perhaps cannot be distinguished from Leontiasis ossium, and one having relationships with Paget's disease, osteitis deformans and with Recklinghausen's osteitis fibrosa. [No mention is made of the conditions analogous to goundou described in apes and Andrew BALFOUR's pony.] The etiology is discussed at some length in connexion with the above-mentioned affections and syphilis as a cause discounted, the therapeutic test having failed in this case (N.A.B., K.I., bismuth). A useful bibliography concludes the paper.

H. S. S.

MOUQUET (A.). *Ostéite hypertrophique rappelant le goundou chez un Cercopithecus aethiops vivant.* [*Hypertrophic Osteitis recalling Goundou in a Cercopithecus.*—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 918-922.

A report upon a *Cercopithecus aethiops* monkey from the Ivory Coast which on arrival in Paris exhibited the condition which has now been described as "Goundou of Monkeys," associated with some bony thickening of the bones of the forearm near the wrist, of the lower end of each femur and the upper end of each tibia. In regard to etiology the author suggests that the disease is one associated with captivity and resembling osteomalacia. The blood was normal. The clinical pictures in this living monkey were compared with those in a cynocephalus skeleton.

H. S. S.

CLIMATIC BUBO.

LILLIE (R. D.). *Inguinal Lymphadenitis with Special Reference to the Group known as Climatic Bubo.*—*Arch. Pathology.* 1929. July. Vol. 8. No. 1. pp. 19-37. With 4 text figs. [10 refs.] [*Hyg. Lab., U.S. Public Health Service, Washington.*]

After referring to the descriptions given by other writers of the histopathology in climatic bubo the author, working in the U.S. Public Health Service laboratory at Washington, sets out notes on some twenty-nine cases of inguinal adenitis from which glands were removed and submitted to him for microscopical examination. Histologically, he found that the cases fell into two groups. Seventeen presented a pathological picture corresponding to that of climatic bubo given by previous authors.

"Summarizing, the first group showed primarily foci of reticulo-endothelial proliferation with central nuclear fragmentation and necrosis, central infiltration with polymorphonuclears or definite formation of abscesses and later homogenization of the contents. In addition, small hemorrhages were frequent. Capillary thickening was common. Often the germinal centers and lymph sinuses were obliterated. Perhaps the most characteristic feature was the occurrence of considerable areas of dense infiltration with plasma cells, pure, or mixed with proliferating fibroblasts and areas of fibrosis. Regularly also there was well marked periadenitis with infiltration with plasma cells, vascular thickening and fibrosis.

"Neither bacteria nor cell inclusions from the nuclear debris in the focal lesions in any of the cases of this group could be identified with certainty."

The remaining cases presented "no especial characteristics to differentiate them from cases of ordinary lymphadenitis." In his conclusion he says, "Climatic bubo is not a clinicopathologic entity. . . . Climatic bubo, while probably commoner in the tropics, is not restricted to this geographic area."

[The cases were admitted to various hospitals for sailors; they were all cases of seafaring men and one understands that the author conducted pathological examinations only and was not responsible for the clinical diagnoses, which in a large proportion of cases was that of climatic bubo. In reading through the clinical notes and histories in the case reports it might be suggested that the diagnosis in a certain proportion should have been "climatic bubo (?)." In many of these the subsequent

pathological investigation negated these queried diagnoses. This suggestion is, I think, warranted in view of lack of precise history in many of the cases. With greater precision in clinical diagnosis, in fact, the opposite conclusion might have been reached, namely, that climatic bubo is a clinico-pathological entity. In many cases there is no history as to the exposure to infection and the presence or absence of an initial lesion is only mentioned twice. There is another point to which allusion is not made, and that is the evolution of the pathological changes in the affected glands, a common omission in dealing with the pathology of a disease. The pathological picture may vary very greatly according to the age, stage and degree of acuteness of the process being studied. In this series in which glands were submitted to microscopical examination excision was the only method of treatment adopted.]

H. S. Stannus.

RUGE (Heinrich). Beitrag zur Klinik der sog. klimatischen Bubonen (105 Fälle). [**105 Cases of Climatic Bubo.**]—*Dermat. Woch.* 1930. Jan. 4. Vol. 90. No. 1. pp. 1-11. With 4 text figs. [Inst. for Ship & Trop. Diseases, Hamburg.]

Writing from the Tropical Diseases Institute, Hamburg, the author gives an analysis of 105 cases of climatic bubo, time and place of infection, incubation period, etc., with notes on clinical manifestations and blood findings. Young adults among white races were almost exclusively seen and in 4/5 of the cases there was a history of sexual contagion. The increasing number recognized each year is remarked. Clinically, the affection is not difficult to recognize and FREI'S skin reaction is very useful. Gland excision is the treatment advocated. The author would retain the name climatic bubo for all cases, tropical and non-tropical, rather than use the term lymphogranuloma inguinale.

H. S. S.

SEMERARO (Arnaldo). Adeniti climatiche. [**Climatic Adenitis.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Nov. 1. Vol. 10. No. 11. pp. 520-529. With 1 coloured fig. English summary p. 529. [Inst. of Trop. Path., Univ., Bologna.]

The condition described, though spoken of as climatic bubo or subacute lymphogranulomatosis, differs in certain respects from what we are accustomed to regard as such in English textbooks. Thus, the most frequent site was the axilla, though inguinal, cervical, and epitrochlear adenitis did occur; males and females were equally affected, and all ages from infants of a few months to adults; the glands often suppurated and the condition "occurred in epidemic form, several members of a family being attacked with adenitis nearly always ending in suppuration." Cultural attempts gave negative results, but complement fixation was positive, the pus being used as antigen. The same, diluted one in five with normal saline and injected in a dose of 0.1 cc., gave a positive intradermal reaction in all cases, it is claimed.

H. Harold Scott.

HERMANS (E. H.). **Lymphogranuloma inguinale**.*—*Beihefte z. Arch. f. Schiffs- u. Trop. -Hyg.* 1929. Vol. 33. No. 3. pp. 214-218 (298-302). With 1 text fig.

This paper is a short discussion upon some points in connexion with lymphogranuloma inguinale. The author has confirmed the work of others in finding that cases of climatic bubo from West Africa and from North Russia where the temperature is 30° below zero all give positive cuti-reactions with FREI's antigen [see this *Bulletin*, Vol. 25, pp. 18 and 666]. Treatment by inoculation with antigen (0.2, 0.4, 0.6 cc. subcutaneously every four days) has given promising results. The reaction is sometimes very marked, and it is in these cases the best therapeutic effect is seen. [It is quite possible, if not probable, that such treatment is of the nature of a non-specific protein shock therapy rather than a specific effect.] In three of the fifteen cases under the author's care the cuti-reaction was negative, but in one of them an auto-antigen gave a positive reaction (this he calls L.G. antigen 2), and this antigen gave a positive in one of the other cases suggesting that there is a group. FREI observed a similar case.

The author then goes on to deal with the condition variously called syphiloma anorectal or esthiome or ulcus vulvae chronicum elephantiasiticum and described by FOURNIER, KOCH, FABRY and JERSILD. Syphilis, tuberculosis, gonorrhoea and ulcus molle have been suggested as causes and von ROEGHOLT, who has seen a good deal of this disease in the Dutch East Indies, upholds the last mentioned, as also JOACHIMOVITS. FREI and KOPPEL, however, in all of five cases, obtained positive skin reaction with a L.G. antigen [see this *Bulletin*, Vol. 26, p. 861]. Hermans, in a single typical case under his care, obtained a similar result—positive in the patient with a L.G. antigen which gave negative reactions in controls and the patient was negative to an ulcus molle antigen, thus confirming FREI and KOPPEL. It appears, therefore, that this second condition seen in women has an etiological relationship to climatic bubo or lymphogranuloma inguinale seen in men.

H. S. S.

THOMSEN (Oluf). Ein Vergleich zwischen den bei Lymphogranuloma inguinale und bei Dubois' Thymusabszess bei angeborener Syphilis wahrgenommenen histologischen Veränderungen. [**Comparison between Histological Changes in Lymphogranuloma Inguinale and Dubois' Thymus Abscess in Congenital Syphilis.**—*Acta Path. et Microb. Scandinavica.* 1929. Vol. 6. No. 4. pp. 379-382. With 2 plates. [2 refs.]

The author's attention was attracted to the histological resemblance between the lymphatic glands in climatic bubo and the so-called Dubois' thymus abscess of congenital syphilis. The well-known picture of the findings in the first condition is closely reproduced in the second as shown by two plates and is discussed in some detail. The cause of climatic bubo is unknown and the author hazards the idea that in Dubois' abscess of the thymus possibly the same cause is at work though it would be necessary to postulate transmission through the maternal germ.

H. S. S.

* Lymphogranuloma inguinale seems an unfortunate term for Climatic bubo, suggesting as it does the totally different condition, Granuloma inguinale or granuloma venereum.

HELLERSTRÖM (Sven). Lymphogranuloma inguinale und strumöse Bubonen. [**Lymphogranuloma inguinale and Strumous Bubos.**]—*Klin. Woch.* 1930. Feb. 22. Vol. 9. No. 8. pp. 349-351. With 1 text fig. [14 refs.] [Karoline Inst., Stockholm.]

A discussion of the differential diagnosis of lymphogranuloma inguinale, as yet by no means certain in all cases. It is urged that serum and skin reaction be carried out in all cases showing buboes, to detect mixed infections. Reference is made to the similarity in the pathological picture found in Dubois' abscess of the thymus in congenital syphilis and the suggestion that all the changes found in lymphogranuloma inguinale could be produced by that disease. It might, however, be suggested that the converse is true, that Dubois' abscess is due to an infection with the unknown virus of lymphogranuloma inguinale in the congenital syphilitic child. The name strumous bubo may cover several conditions, but that typically met with in children secondary to a tuberculous lesion of the skin should be definitely distinguished from lymphogranuloma inguinale.

H. S. S.

HOEPLI (R.). Ueber die Histopathologie der klimatischen Bubonen. [**Minute Pathology of Climatic Bubo.**]—*Dermat. Woch.* 1930. Mar. 1. Vol. 90. No. 9. pp. 305-314. With 5 text figs. [8 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

— Zur pathologischen Anatomie der klimatischen Bubonen. [**Pathological Anatomy of Climatic Bubo.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 219-223 (303-307). With 4 text figs. [1 ref.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The author gives short notes of 36 cases, and then discusses his pathological findings. Swelling of glands is moderate and characteristically small abscesses occur; areas of necrosis are small; connective tissue changes are rapid with only a minor degree of granulation formation; there is degeneration of vessel walls; eosinophilia and giant cell formation are present with replacement of lymphocytes by larger cells of different origin and plasma cells. The histological picture is uniform and if not actually specific is, at all events, characteristic.

H. S. S.

FREI (Wilhelm). Weitere Beiträge zur Kenntnis der Lymphogranulomatosis inguinalis und des Ulcus chronicum elephantasticum vulvae et ani. [**Further Contributions to the Knowledge of Lymphogranuloma Inguinale and Ulcus chr. elephant. vulvae et ani.**]—*Klin. Woch.* 1929. Oct. 29. Vol. 8. No. 44. pp. 2038-2042. [18 refs.] [Skin Clinic, Univ., Breslau & Municipal Hosp., Berlin-Spandau.]

The author's conclusions are as follows: The skin reaction in climatic bubo is specific and not given by cases of ulcus molle; a negative reaction is not so certainly of value in diagnosis. That a bubo due to ulcus molle can resemble the picture of climatic bubo has never been shown. Much less likely is it that confusion could arise

between ulcer molle and chronic ulcerative elephantiasis of the vulva and anus. Thirteen cases of this latter condition with positive L.-I. reaction are now on record and it seems that L.-I. can without clinical manifestations give rise to a lymph gland condition conforming with chronic ulcerative elephantiasis.

H. S. S.

FREI (Wilhelm). Eine noch wenig bekannte, auch in Berlin vorkommende Geschlechtskrankheit, die Lymphogranulomatosis inguinalis, ihre Folgeerscheinungen und ihre Bekämpfung. [**Lymphogranuloma inguinale, a Little-known Venereal Disease occurring in Berlin.**—*Med. Klin.* 1930. Feb. 28. Vol. 26. No. 9. pp. 305-307. [Municipal Hosp., Berlin-Spandau.]

A paper read before the Berlin Medical Society giving a general account of climatic bubo, its diagnosis and treatment. The author points out how necessary it is for every practitioner to be on the look out for these cases which of recent years are more frequently seen in Europe.

Under treatment, surgical intervention and the exhibition of antimony in some form are the only methods discussed and no mention is made of the use of T.A.B. vaccine.

H. S. S.

HELLERSTRÖM (Sven). Ueber die Differenzialdiagnose zwischen Lymphogranuloma inguinale und anderen Bubonenformen. [**Differential Diagnosis of Lymphogranuloma Inguinale and Other Buboes.**] *Acta Path. et Microb. Scandinavica*. 1930. Supplement V. pp. 77-79.

The opening of a discussion emphasizing the difficulties of making a diagnosis between L.I. and other inguinal buboes whether of tuberculous origin, due to syphilis, gonorrhea, ulcer molle, or merely pus infections. The clinical features are unreliable and the histopathological pictures confusing in many cases. Recourse must be had to all aids in differentiation including the Frei and Ito intracutaneous reactions.

H. S. S.

GRACEY (D. Ivan). **Climatic Bubo.**—*Malayan Med. Jl.* 1929. Dec. Vol. 4. No. 4. pp. 142-143. [1 ref.]

A note confirming the excellent results obtained by treating climatic bubo by means of intravenous T.A.B. vaccine as advocated by HANSCHALL. The method was used in "a large number of patients at the General and District Hospitals, Penang."

H. S. S.

KOPPEL (Alice). Lymphogranuloma inguinale und seine Beziehungen zum Syphilome anorectal. [**Lymphogranuloma inguinale and its Relations to Anorectal Syphiloma.**]—*Klin. Woch.* 1929. July. 2. Vol. 8. No. 27. p. 1263.

The author alludes to a previous article by herself and FREI on the subject, in which they expressed the belief that there often appeared to be a syphilitic factor involved in the production of this condition as well as lympho-granuloma. In the two further cases now described, however, syphilis was excluded.

H. S. S.

PLAGUE.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE. TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 2. pp. 1-130. [11 papers on Plague.]

The papers on plague which were read at this Congress consisted, in general, of reviews of various aspects of the subject, and contained little that has not already received attention in the *Bulletin*. The contribution by NAIDU and JUNG on Haffkine's plague prophylactic gives a full account of the methods in use at the Haffkine Institute in Bombay for its preparation and standardization. Technical details which should interest those engaged in similar work include the choice of a highly virulent culture for the production of the vaccine; the employment of *M. rattus* from Madras, weighing from 65 to 80 grammes, as the test animal; the lack of relation between the degree of alkalinity of the finished product and its potency; and the suggestion that a relation may exist between the "roughness" and "smoothness" of the culture and the efficiency of the vaccine prepared from it: a preponderance of "rough" colonies is apparently associated with diminished potency.

In this paper there will be found a table which summarizes observations on the susceptibility of Bombay rats to experimental infections with plague, which were made from June, 1924 to October, 1927. Altogether, 2,450 rats were tested, and on the average about 75 per cent. survived. When the Plague Research Commission were working on the experimental transmission of plague by the rat-flea in 1905-06 they found that about 40 per cent. of the Bombay rats were unaffected by the cutaneous inoculation of small doses of a plague culture. It thus appears that in the interval of 20 years the immunity of the rat population in Bombay has significantly increased, and that the enhanced immunity is probably an important cause of the relative freedom from plague which the human population now enjoys. These data constitute apparently the best evidence that has so far been obtained in explanation of the natural decline of epizootic and epidemic plague.

A paper by NAIDU and AVARI on the treatment of bubonic plague in India gives a useful summary of the methods that have been tried. The multiplicity of these methods is doubtless correlated with the severity of the infection as indicated by the high death-rate and with the difficulty of checking the growth of the plague bacillus in the tissues and of neutralizing its specific toxin when liberated at the sites of bacillary deposits. Apart from appropriate surgical and medicinal treatment, special methods have proved of little avail. These include the use of so-called chemo-therapeutic substances (carbolic acid, formalin, salvarsan, eusol, mercurochrome and iodine); specific vaccine therapy; and the administration of bacteriophage.

A commentary by D'HERELLE on the failure of "phage" to control the infection in Indian patients is incorporated in this article. He concludes that the material employed was not sufficiently potent to deal with the strains of *B. pestis* in India, which, in his opinion, are extraordinarily virulent. He states that in a closely allied disease,

namely, haemorrhagic septicaemia in buffaloes, a single injection of from 30 to 40 cc. of a very potent "phage," capable of producing complete lysis within 3 hours, resulted in prompt recovery, whereas natural recovery never occurs in this disease.

NAIDU and AVARI give an analysis of the action of specific sera for plague in man, and conclude that, although serum treatment ameliorates the symptoms, the degree of improvement is not such as to lower appreciably the mortality rate.

A paper on the same subject by Dr. P. T. PATEL, who is medical superintendent of the Arthur Road and the Maratha Plague Hospital in Bombay, is on similar lines and reaches similar conclusions. Dr. Patel rightly urges the necessity for the administration of the serum in sufficient dosage at the earliest possible moment and, in severe cases, by the intravenous route. He writes: "In my experience the specific antitoxic serum in plague is as necessary a part of the treatment as is diphtheria antitoxin in diphtheria." In the reviewer's opinion the question of serum-therapy in plague is likely to remain in an unsatisfactory state until research has indicated the essential components in plague serum, whether antitoxic or antibacterial, and how they may be titrated in terms of a standard unit.

In the discussion which followed PATEL stated that during the last 6 years he had not seen a single case of primary pneumonic plague in Bombay, but that during this period secondary plague pneumonia was recognized in 12 or 13 per cent. of 800 bubonic cases. Lt.-Col. J. TAYLOR, I.M.S., stated that his experience in Bombay and elsewhere was in agreement with the observations of Dr. PATEL.

G. F. Petrie.

SYMES (C. B.). **Note on the Epidemicity of Plague.**—*Kenya & East African Med. Jl.* 1930. Mar. Vol. 6. No. 12. pp. 346-357. With 1 fig.

The evidence upon which the author founds his opinions is taken from the medical reports of Kenya and other territories, 13 in all. The amount of plague in man and rodents is given year by year—7 to 14 years according to the available records. These details cannot be given or condensed. A chart is also given. There is at least a suggestion that in this part of Africa a plague periodicity occurs in areas to which the disease has once been introduced. There is ample evidence, mostly from South Africa, that plague persists in African wild rodents. Gerbilles are particularly guilty in S. Africa, a species of *Arvicanthis* in Kenya. The author further concludes that: (1) The epidemicities of African and Indian plague as shown by present records are very dissimilar; and (4) that until a study of wild rodents is made over a representative area there will be no answer to the following questions: (a) Why has Sierra Leone remained entirely free from plague? (b) Why are locations along the Kenya-Uganda border, in the Singida district of Tanganyika, and North Nyasa district of Nyasaland, and several other places in East and West Africa apparently permanent endemic centres? (c) Why in a district such as South Kavirondo in Kenya with a population of some 300,000, does plague appear in perhaps half-a-dozen

widely separated districts almost simultaneously, and yet never assume epidemic proportions?

J. H. Tull Walsh.

DOORENBOS (W.). Onderzoekingen over de pathogenesis der pest. [Examination of the Question of Pathogenicity in Plague.]—*Nederl. Tijdschr. v. Geneesk.* 1930. Feb. 22. 74th Year. 1st Half. No. 8. pp. 880-893. [Refs. in footnotes.]

In this article the author goes over the possible explanations of the variability of plague pathogenicity in animals and man. Some experiments are given in support of the ideas promulgated. He invokes, as has been done in the case of cholera, the action of other organisms and particularly intestinal organisms of *Bact. coli* and *Proteus* type, in interpretation of plague pathogenicity in certain cases. The intestinal flora of laboratory animals at certain times of the year may be in a state of potential activity. With a plague infection superadded the resulting epizootic may be of a severe type. The severity is not explainable by virulence of the plague organism alone and so it may be that we have here a case of "symbiotic intoxication" or "commensal infection." His argument with regard to one form of bacteriophage action is somewhat novel. Plague bacilli in association with plague bacteriophage may, when fed to a rat, afford a culture from the blood of the animal of plague bacillus together with plague bacteriophage. The action of a plague bacteriophage under natural conditions may not so much be to dissolve the plague bacillus as to convert it into the equivalent of a vaccine or an organism of little virulence. The flea which ingests the blood of a rat containing plague bacilli of low virulence along with bacteriophage may then become a transmitter of the combination; become in fact a "vaccine centre," in as much as the rats to which it transmits may suffer only from a light form of infection and develop actual immunity. This and other such points of plague pathogenesis are raised in this exposition, not so much to be finally answered, as to indicate lines along which work is taking place.

W. F. Harvey.

NIGERIA. **Annual Report on Plague in Nigeria, 1928** [BELL (W. J.), Senior San. Officer].—*Ann. Med. & San. Rep. Nigeria, 1928*. Appendix F. pp. 99-118. With 2 folding maps & 2 folding charts.

This is an official report giving the statistics of plague in and around Lagos; also the numbers of rodents examined. Of these, 29 infected rodents were found among 81,492 examined. Particular attention is paid to the incinerators of refuse, covering of food, cutting the bush well back from dwellings, proper storage of material likely to give cover to rodents, sealing cracks in walls and floors and proper conduct and cleanliness of slaughter houses. It is remarkable that human and rodent plague should have apparently disappeared from the mainland at a time when this area has been constantly exposed to infection from one of the worst years of epidemic in Lagos.

J. H. T. W.

SCHWETZ (J.), FORNARA (L.) & COLLART (A.). La peste dans la région du Lac Albert (Congo Belge). [**Plague near Lake Albert, Belgian Congo.**—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 219–263. With 4 maps (1 folding) & 11 figs. on 8 plates. [10 refs.] [Parasit. Lab., Stanleyville.]

This is the report of a mission sent to investigate plague in the region of Lake Albert. The authors begin with the geography of the region around Lake Albert and with a short description of the lake itself, the villages and population. The various rodents captured and their fleas are tabulated. The most common of the rodents were *Mastomys ugandae* and *Arvicanthis abyssinicus* with *Xenopsylla brasiliensis* and *Dynopsyllus lupus* as flea parasites. These two animals are seen in one of the several good photographs which appear in the report. The cases of plague seen in various villages are given in tabular form. All forms of plague—bubonic, septicaemic and pneumonic—were found. A programme for prevention was arranged by the Mission.

J. H. T. W.

STRICKLAND (C.) & ROY (D. N.). **Calcutta Rat Fleas. A Contribution to the Epidemiology of Plague in India.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 497–502. [11 refs.] [School of Trop. Med., Calcutta.]

The authors state that scanty attention has hitherto been given to the rat fleas of Bengal. The work here recorded shows the prevalence and distribution of *X. cheopis* and *X. astia* for a whole year, December 1925 to December 1926. *Ctenocephalus felis orientis* was also found in small numbers for the first time. The figures given show that in Calcutta *astia* is the predominant flea and that, following the opinions of HIRST & CRAGG, the absence of severe epidemics there conforms to the rule. The differentiation of specific flea rates on the different species of rats was:—

X. cheopis per 100 rats:—*M. decumanus* 85; *N. bengalensis* 117;
M. rattus (4/7).

X. astia per 100 rats:—*M. decumanus* 251; *N. bengalensis* 235;
M. rattus (4/9).

J. H. T. W.

WEBSTER (W. J.) & CHITRE (G. D.). **Observations on Rat-Fleas and the Transmission of Plague. Part I.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 699–709. [4 refs.] [Haffkine Inst., Bombay.]

The League of Nations Committee which met in Calcutta in December 1927 proposed for future study "Investigation of the comparative epidemiological rôle of the various species of fleas in plague transmission in selected areas of India." Experimental work has been carried on by the authors of this paper during 1928–29, in Bombay, with *X. cheopis*, *X. astia* and *X. brasiliensis* found locally. Clean laboratory-bred fleas were used and a simple method of raising families of rat fleas is described. Both *cheopis* and *astia* have been found capable of keeping up epizootic plague under very favourable experimental conditions in the Bombay hot weather. Successful trans-

mission by *X. brasiliensis* is recorded. A note on the longevity of fleas fed entirely on human blood is appended :—

Rat-Fleas fed from Birth on Human Blood only.

Number of Experiment.	Date of Birth of Flea.	Species.	Sex.	Length of Life in Days.	Feeds offered.	Feeds accepted.
B22	4-9-28	<i>X. cheopis</i>	Female	162	136	42
B23	5-9-28	<i>X. cheopis</i>	Male	63	53	28
B34	18-10-28	<i>X. astia</i>	Female	53	47	13
B42	5-11-28	<i>X. brasiliensis</i>	Female	127	57	31
B33	18-10-28	<i>X. brasiliensis</i>	Male	68	60	29

J. H. T. W.

PHIPSON (E. S.). Sur l'épidémie de peste d'Aden de 1928. [**Plague in Aden.**]—*Bull. Office Internat. d' Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 266-268. [1 ref.]

The only special point in this paper is connected with the introduction of the infection. The author says that infected rats cannot reach the shore, because ships anchor well away from the shore ; but that in all epidemics of plague the disease begins among the coolie population employed on and about the ships. He concludes that the disease is introduced into Aden by man with or without the co-operation of infected fleas. A table is given showing the undoubted value of anti-plague inoculation.

J. H. T. W.

KURAUCHI (K.). **Epidemiology of Plague in Inner Mongolia. Plague Studies I.**—*Jl. Oriental Med.* 1930. Apr. Vol. 12. No. 4. pp. 33-34. [Hyg. Inst., S. Manchuria Rly. Co., Dairen.]

As there is no word for plague in Inner Mongolia, it is thought that the disease was introduced some ten years ago, probably from Transbaikalia or Outer Mongolia, where tarabagan pest prevails. While previous epidemics are mentioned, the author deals chiefly with the outbreak in 1928 in three separate localities. In Chien-Chia-Tien one-third of the inhabitants—378 persons—died in three months. Five thousand rats were examined, but no case of plague was found among them. The author thinks that the disease would seem to spread from man to man and also from hamlet to hamlet ; but he is of opinion that the suslik is responsible for plague epidemics in Inner Mongolia.

J. H. T. W.

THIROUX (A.). Recherches sur les causes de l'existence de la peste pulmonaire dans les régions froides ou tempérées et de son absence dans les zones à température élevée, à Madagascar. [**Pneumonic Plague Present in Cold Regions and Absent in Zones of High Temperature in Madagascar.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 704-711.

As the result of his investigations during 1927 and 1928, the author states that the only factor which need be considered in this matter of

the absence of pulmonary plague in the hot regions of Madagascar, while it exists on the colder plateaux, is that of minimum temperature. No epidemic of pulmonary plague has been observed in Madagascar in regions where the absolute minimum temperature is not below 16° C.

J. H. T. W.

BOYÉ. Les relations entre la peste pulmonaire et la température. [**Relation between Pneumonic Plague and the Temperature.**].—*Bull. Office Internat. d' Hyg. Publique*. 1930. Feb. Vol. 22. No. 2. pp. 274-276.

This note refers to the distribution of pulmonary plague in Madagascar and gives the conclusions found after observation. (1) Pulmonary plague may occur on the plateaux regions at any time of the year. (2) Cases of pulmonary plague have a maximum of frequency whenever the temperature descends below 14° C. (4) When the general temperature is above 16° cases of pneumonic plague are not seen.

J. H. T. W.

TSUCHIYA (K.) & CHUAN (Li Te). **Report on Natural Recovery from Bubonic Plague.**—*Jl. Oriental Med.* 1929. Sept. Vol. 11. No. 3. pp. 85-90. [8 refs.] [Hyg. Inst., S. Manchuria Rly. Co., Dairen.]

The authors report about 10 cases of natural recovery from bubonic plague found among 378 cases at Chian-Chia-Tieu, Inner Mongolia, from September to November 1928. The authors began to investigate the epidemic on October 24th. Cases were found recovering, but showing signs of an attack. Positive results were obtained from the blood of three of these cases by agglutination and by precipitation tests. These cases had not received serological or surgical treatment and the blood was taken 4 or 5 weeks after infection.

J. H. T. W.

LEFROU (G.). La peste à vomissements noirs. [**Plague with Black Vomit.**].—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 102-103. [1 ref.]

The author records two cases of plague with black vomit which occurred during an epidemic in Saint-Louis. The first was a native soldier who died suddenly in hospital with fever and a small inguinal bubo. Smears from the liver showed Yersin's bacillus in abundance. The black liquid removed contained much blood and also showed plague bacilli. The second case was that of a native boy, 15 years of age, who while being removed from his home had a serious attack of "black vomit." He died on arrival at the hospital. He suffered from fever, headache and a small inguinal swelling. The liver showed abundant plague bacilli.

J. H. T. W.

SCHUT (J.). Weitere Versuche mit Omnadin bei Lungenpest in dem Tengger (Java). [**Further Trials of "Omnadin" in Pneumonic Plague in Java.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Apr. Vol. 34. No. 4. pp. 223-227.

— Verdere proefnemingen met Omnadin bij Longpest in den Tengger (Java).—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. Apr. 1. Vol. 70. No. 4. pp. 314-321.

"Omnadin" is issued by the Bayer Products, Ltd., and is stated to be "Compound Sarcine vaccine containing the three great reactivating groups: albumins, lipoids and fats," useful for all infections accompanied by sepsis and high temperature. During 1927, 1928 and 1929 the author has endeavoured to control pneumonic plague outbreaks by injecting "Omnadin" into all contacts as soon as possible. He describes cases of pneumonic plague which died in November, 1927, between the 19th and 22nd. On the 21st the family were isolated, in all, 11 persons. One died on the 22nd. The "Omnadin" treatment of all contacts began on the 24th. Of these 11 persons two died, in spite of the "Omnadin" injections—dose 2 cc.—but the others escaped. Previous to the "Omnadin" treatment four deaths had occurred among this group and the plague bacillus was found in the lungs. In March, 1928, two members of a family died, a girl (showing no bubo) and her mother, in whom buboes appeared in the neck just before death. *Past. pestis* was found in the lungs, but, without waiting for the laboratory diagnosis, the author gave "Omnadin" injections to six contacts dwelling in the house. They all remained healthy. In 1929 the author had a somewhat similar experience and he believes that early use of "Omnadin" will protect contacts from plague.

J. H. T. W.

CAIUS (J. F.) & NAIDU (B. P. B.). **Chemotherapy of Bubonic Plague.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 481-487. [1 ref.] [Haffkine Inst., Parel, Bombay.]

This paper is a summary of results the authors have obtained in a first attempt at determining the bactericidal action of antiseptics on *Past. pestis*, and the effect of some of them on plague-infected animals. Phenols, mercurated phenols, phthaleins and dye-stuffs were used and many of these last have strong bactericidal action *in vitro*. To find the therapeutic value of these drugs is more difficult. Mercurochrome, active *in vitro*, has no influence on plague in rats or rabbits [this *Bulletin*, Vol. 24, p. 455 (NAIDU)]. The same is the case with resorcinol and mercurated trypan-blue.

J. H. T. W.

GAUD (M.). Sur la vaccination antipesteuse au cours de l'épidémie du Sous (Maroc) en avril-juin 1929. [**Anti-Plague Vaccination in Sous, Morocco.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 271-273.

The population of the district immediately affected is about 8,670. All these people were inoculated with two injections of anti-plague serum from the Pasteur Institute. 357 cases of plague occurred among them—327 before "vaccination" was completed and 30 afterwards. In addition the population of the entire region was inoculated, making

19,120 "vaccinations." Among the 327 cases not inoculated, 185 died; among the 30 attacked after general "vaccination" was complete, 24 died.

J. H. T. W.

BOYÉ. Sur la vaccination antipesteuse en Afrique Occidentale Française en 1928. [**Anti-Plague Vaccination in French W. Africa 1928.**]—*Bull. Office Internat. d'Hyg. Publique.* 1929. Oct. Vol. 21. No. 10. pp. 1691–1695. [1 ref.]

While in Dakar anti-plague vaccination was combined with a war against rodents, prevention in the surrounding districts depended upon anti-plague vaccine alone. The number of rats captured in 1928 reached 86,383 in the first eight months owing to the zeal of the natives being stimulated by a reward of 40 centimes for each rat brought alive to the Sanitary Officer. It was not possible to make vaccination compulsory, but, with help from the more influential inhabitants, 6,500 inoculations were made. In Senegal there were 116,822 with anti-plague lipo-vaccine during the year. 165 vaccinated persons out of this number were attacked with plague and the total number of plague cases was 1,950.

J. H. T. W.

RAGAZZI (Carlo Alberto). Profilassi immunitaria della peste in Cirenaica. [**Immunization against Plague in Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Aug. 1. Vol. 10. No. 8. pp. 390–411. [11 refs.] English summary p. 412. [Inst. of Trop. Path., Univ., Bologna.]

The writer reports a large experience in anti-plague vaccination performed in Cyrenaica during 1914–18. An improved vaccine was made in a local laboratory. Upon the results of his observations the author draws his conclusions as to the value of anti-plague vaccination, supported by the opinion of others.

J. H. T. W.

COMPTON (Arthur). **Immunization in Experimental Plague by Subcutaneous Inoculation with Bacteriophage. Comparison of Plain and Formaldehyde-treated Phage-lysed Plague Vaccine.**—*Jl. Infect. Dis.* 1930. Feb. Vol. 46. No. 2. pp. 152–160. With 2 text figs. [9 refs.] [Public Health Labs., Alexandria, Egypt.]

Phage-lysed plague bacilli, used as vaccine subcutaneously in 3 doses at weekly intervals, are capable of producing a substantial immunity to a test mortal dose. The treatment of the phage vaccine by formalin kills the phage but does not destroy its immunizing power; indeed, the immunization effected was even better than with vaccine containing active phage. Locally, the test dose produced ulceration and necrosis. No evidence was obtained to show that the immunity was due to the phage itself instead of to the lysed bacterial products of the bacilli.

W. F. Harvey.

NICOLLE (Charles), DURAND (Paul) & CONSEIL (Ernest). Vaccination préventive contre la pneumonie pesteuse par voie respiratoire. [**Vaccination against Pneumonic Plague by the Respiratory Tract.**]—*C.R. Acad. Sci.* 1930. Jan. 27. Vol. 190. No. 4. pp. 235–237.

In Tunis a severe epidemic of pulmonary plague broke out among

members of a particular tribe which had little or no contact with the rest of the population of the town. The whole of this tribe, 900 individuals in all, was successfully removed in one night to two different buildings outside the town. Not a single new case of plague pneumonia occurred thereafter in the town itself. A new method of preventive vaccination was adopted side by side with the usual method of subcutaneous inoculation. By this method a powder is inhaled in the dose of 3,000 million organisms at a sitting. The treatment was administered daily and in 214 cases was continued for 16 days. Among 503 individuals, inoculated subcutaneously, there were 5 cases of plague pneumonia, all fatal, while among 363 vaccinated by inhalation there were 3 cases with one recovery. The authors do not come to any definite conclusion on the efficacy of respiratory vaccination, but believe it is a method to be tried for such an affection as plague pneumonia, which is otherwise a hopeless condition.

W. F. Harvey.

FLU (P. C.). Immuniseering van ratten tegen pest door middel van geconcentreerde bacteriophagaglysaten uit virulente pestbacteriën. —*Nederl. Tijdschr. v. Geneesk.* 1929. Aug. 31. 73rd Year. 2nd Half. No. 35. pp. 4010-4020. [10 refs.]

——. **Immunization of Rats against Plague by Means of Bacteriophage-lysates of Concentrated Suspensions from Virulent Plague Bacteria.** —*Jl. Trop. Med. & Hyg.* 1929. Dec. 16. Vol. 32. No. 24. pp. 353-356. [9 refs.]

——. Immunisierung von Ratten gegen Pest mit Hilfe von Extrakten aus virulenten Pestbakterien. (Der Bakteriophag als Lösungsmittel.)—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 223-232 (307-316). [5 refs.]

The bacteriophage in these experiments is used for the purpose of bringing into solution a large quantity of plague bacillary substance which is then used as the immunizing material. The main principles of the manufacture of this lysate have already been described (see this *Bulletin*, Vol. 26, p. 638). The plague bacillus and the plague bacteriophage must both be highly virulent. It is essential, if a vaccine is to be popular, that it shall not cause a very severe reaction. The author himself tried an injection subcutaneously of 1 cc. of the vaccine used for immunization of rats. Pain developed at the site of injection in about 3 hours' time and increased somewhat. It had almost disappeared by evening, although tenderness to pressure remained for 3 days. Swelling was present only for a few hours after injection and there were no general symptoms. The experiments made on rats had reference to the success obtainable by means of one, two and three successive prophylactic doses. The first attempt at immunization with a single dose of 3 cc. was not successful, probably because the prophylactic dose itself was too large. Better results were obtained with smaller doses. The series of inoculations and doses used in white rats were, three times with 0.25, 0.5 and 0.75 cc.; three times with 0.5, 1 and 1½ cc.; twice with 1½ and 1½ cc., and once with 1½ cc.; the mortality results were 2 out of 10, 2 out of 8, 1 out of 10, and 3 out of 17, respectively. Conclusions are that a concentrated suspension of virulent plague bacilli can be dissolved by bacteriophage to give a large amount of bacterial substance in a small amount of liquid, ready for use as a

vaccine, and a sufficient protection even with one dose in rats, without local or general symptoms. It seems worth while investigating how far the extracts of plague bacilli prepared with bacteriophage would be useful in the prophylactic inoculation of human beings.

W. F. Harvey.

FLU (P. C.). De bacteriophag-antipest en de prophylaxis en therapie der experimenteele pest. [**Antiplague Bacteriophage in Prophylaxis and Treatment.**]*—Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Oct. 1. Vol. 69. No. 10. pp. 958-966. [3 refs.]

In discordance with the results attained by D'HERELLE and DOORENBOS at Alexandria with the bacteriophage treatment in cases of human plague, Flu could only register negative results in his experiments, which are presented in tabular form. In the blood of fowl (naturally immune to plague) the bacteriophage had no influence on the time during which the plague bacilli circulated in the blood after inoculation. Administration of bacteriophage to guineapigs subcutaneously either once or in repeated doses, or to white rats orally either 3-4 weeks before or immediately after the plague inoculation, yielded completely negative results.

W. J. Bais.

DOORENBOS (W.). Opmerkingen naar aanleiding van de proeven van Flu betreffende immunisatie tegen pest, in verband met eigen ervaringen met pest en pestbacteriophag. [**The Experiments of Flu on Plague Immunization and Personal Experiments with Plague and Plague Bacteriophage.**]*—Nederl. Tijdschr. v. Geneesk.* 1929. Nov. 23. 73rd Year. 2nd Half. No. 47. pp. 5472-5482. With 2 charts in text. [5 refs.]

After the rejection by OTTEN of plague prophylactic vaccination in Java as affording little protection against the disease, endeavours have been made to discover a better vaccine. It appeared from the experiments of FLU upon animals that this might be found in the bacteriophage lysate of plague bacilli. These experiments, however, did not always prove successful and some inoculated animals died of acute plague, even although the incubation period was lengthened by comparison with uninoculated animals. Experiments by the author afford grounds for the conclusion that this adverse result in inoculated animals is a plague intoxication, due to activation of intestinal organisms. Inoculation of plague in animals suffering from intestinal affections may result in rapid death with lesions of severity altogether disproportionate to the number of plague bacilli found in them. This is ascribed to symbiotic intoxication with pathogenic intestinal bacteria. The argument, generally, has much analogy with that used by SANARELLI in ascribing acute choleraic intoxication with algidity to a combined action of cholera vibrios with intestinal bacteria. An increased resistance to the plague bacillus may certainly be the result of vaccination with bacteriophage lysate, but this does not imply protection against a plague intoxication and should not be regarded as equivalent to a plague immunity. It is then not altogether surprising that, along with good results from the bacteriophage vaccine of FLU,

complete failures are also manifest. The conclusion seems obvious that, before this newer procedure is tested out on man, it is imperative to make further study of the pathogenesis of acute plague intoxication.

W. F. Harvey.

PIRIE (J. H. Harvey). **Plague Studies. I. Bacteriophage in the Prophylaxis and Treatment of Experimental Plague. II. Microbic Dissociation of *B. pestis* and its Importance in Connection with the Preparation of Plague Vaccine and Serum. III. A Veld Rodent Epizootic due to a *Pasteurella* other than *Pasteurella (Bacillus) pestis*.**—*Publications of South African Inst. Med. Res.* 1929. Dec. Vol. 4. No. 25. pp. 191-230. [27 refs.]

I. The success obtained with a prophylactic vaccine of *Past. pestis* lysed by bacteriophage was not of a very high order and only obtainable with repetition of dose. In the experiments with therapeutic bacteriophage it was found, in accordance with general experience, that the strain had to be of very high virulence and even then gave inconsistent results and partial success.

II. Dissociation of the *Past. pestis* was effected and forms obtained which, on first isolation, probably corresponded to the "S" and intermediate "O" forms. The culture, after 2½ years in the laboratory with monthly subculture, was reinvestigated and dissociation ultimately effected into presumed "S" and "R" types, which remained true. Differences between the types are given in tabular form. An "R" type is not likely to be of any value in the preparation of plague vaccines and sera. The contentious subject of the identity of the *Past. pseudotuberculosis* of rodents with *Past. pestis* is discussed and the author considers that he may have been able to convert an "R" form of *Past. pestis*, with characters very similar to *Past. pseudotuberculosis*, into an "S" or virulent *Past. pestis*.

III. The epizootic took place among Namaqua gerbilles (*Desmodillus auricularis*) and gave rise to the suspicion that it was plague. An organism was isolated with the characters of a *Pasteurella*, but the exhaustive examination of this organism both in the field and the laboratory leads the author to regard it as a new species, for which he proposes the name *Past. desmodilli*.

W. F. Harvey.

BEZSONOVA (A. A.) & LENSKEYA (G. N.). **Broth-Clouding Variations of *B. pestis*. (Materials on Dissociation of *B. pestis*.)**—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 3. pp. 270-279. With 7 text figs. [43 refs.] [In Russian. English summary pp. 354-356.]

Four out of 150 strains of *Past. pestis*, which had been kept at room temperature without subculture for five months, gave rise to a uniformly diffuse turbid growth in broth instead of the usual flocculent growth and clear medium. Two of these strains reverted to the usual type of growth with the next subculture. Further investigation of the two broth-clouding strains led the author to consider that this was a dissociation phenomenon, referable to a smooth colony type which, like the smooth colonies of *B. anthracis*, proved an exception to the general rule and was avirulent.

W. F. Harvey.

IWANOWSKY (N.), GUBAREW (E.) & GOLOW (D.). Der chemische Bestand des Blutes bei experimenteller Pest der Meerschweinchen. [The Chemical Condition of the Blood in Experimental Plague of Guinea-pigs.]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 3. pp. 291–295. [14 refs.] [In Russian. German summary p. 358.]

The average chemical composition of guinea-pigs' blood in mgm. per 100 cc. is: sugar 117.9; residual nitrogen 35.08; calcium 7.23; chloride 507.2. In 8 guinea-pigs inoculated with plague there was increase of both residual nitrogen and calcium and decrease of chloride: sugar concentration remained unchanged. The rise of the nitrogen may be taken as an indicator of the condition of the animal, but the chemical changes in the blood in plague are in no way specific.

W. F. Harvey.

BEZSONOVA (A. A.). The Hungry Acid Agar as a Differentiating Medium for *B. pestis* and *B. pseudotb. rod. Pfeiffer*.—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 3. pp. 264–269. With 2 text figs. [In Russian. English summary pp. 353–354.]

With "hungry" agar, which is agar made without broth, a medium can be obtained which will serve to differentiate *Past. pestis* and *Past. pseudotuberculosis rodentium*. A suspension of 1 loopful of agar culture in 5 cc. normal salt solution is used for sowing. One loopful of this suspension is sown on 3 per cent. agar made with normal salt solution and with reaction pH 5.9–6.1. Of the 150 strains of *Past. pestis* tested not one gave any growth, while all the 11 strains of *Past. pseudotuberculosis rodentium* grew on this medium.

W. F. Harvey.

KOROBKOVA (E.). Changement de pH et phénomènes de réduction observés au cours du développement de *B. pestis* et de *B. pseudotuberculosis rodentium*. [Alteration of pH and Phenomena of Reduction by *Past. pestis* and *Past. pseudotuberculosis rodentium*.]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 4. pp. 435–457. [15 refs.] [In Russian. French summary pp. 484–486.]

BEZSONOVA (A.). Peptonised Rhamnose-containing Water as a Differentiating Medium for *B. pestis* and *B. pseudotuberculosis rod. Pfeiffer*.—*Ibid.* pp. 458–461. [12 refs.] [In Russian. English summary pp. 486–487.]

In the first of these papers the alterations in pH occurring in Martin broth which has been fermented by yeast and has been adjusted to a reaction of pH 5.8–6.0 are described. The broth is sown with 0.2 cc. of a 48-hr. bouillon culture of *Past. pestis* and *Past. pseudotuberculosis rodentium* and the reaction measured daily for 10 days and continued at longer intervals up to 35 days. The alkalization of the medium begins much more rapidly with the latter, but by degrees the difference of reaction between the two is equalized. The difference in reducing action of the two organisms is another means by which they may be separated. Methylene blue and Janus green are the best indicators to use in a Martin broth of pH 6.8–7.0. The dyes are decolorized much more rapidly and intensively by *Past. pseudotuberculosis rodentium* than by *Past. pestis*.

In the second paper, the author uses a medium with the composition: rhamnose 1 per cent., peptone 0.5 per cent., and salt 0.5 per cent. of pH 7.2, containing litmus as indicator. Whereas 10 strains of *Past. pseudotuberculosis rodentium* produced acid in 24 hours at 28–30° C., 160 strains of *Past. pestis* produced no change even after 3 weeks.

W. F. Harvey.

MITCHELL (J. A.). Une épizootie chez les rongeurs sauvages dans le district de De Aar et les districts environnants de la province septentrionale du Cap. [**Epizootic among Wild Rodents in and near De Aar, S. Africa.**].—*Bull. Office Internat. d' Hyg. Publique*. 1929. Oct. Vol. 21. No. 10. pp. 1696-1709. With 1 map.

On November 5th, 1928, the magistrate of De Aar sent a message to the Chief Health Officer, Pretoria, stating that rats were dying in the gardens of the town. Dead rats were sent to the Research Institute in Johannesburg. The Press reported "thousands of rodents sick and dying" in De Aar and "a great migration of rodents from West to East." Dr. LAING was sent to De Aar to investigate, together with an Inspector of rodents (CHIVERS). Inspection and enquiry showed that, although the statements in the Press were somewhat exaggerated, there did exist a virulent and widespread epizootic, especially among rodents moving from the West. The town and railway were practically free from domestic rats (*R. rattus rattus*), but domestic mice were found. The gerbilles (*Desmodillus auricularis*) were severely affected and had entered the town during the early nights of the epizootic, and as many as 10 to 20 dead ones were often found in a single garden. Sometimes the long-eared mouse (*Malacothrix typicus*) was found. The municipal staff killed 103 rodents the first night of the operations and about the same number the second night. Dead bodies of rodents sent to the Research Institute, Johannesburg, arrived much decomposed, but microscopical examination strongly suggested plague. Animal inoculations gave only negative results. The map shows the wide extent of the epizootic. Plague certainly existed in Petrusville, 70 miles N.E. of De Aar, both bubonic and pneumonic (one case). As the epizootic was traced to other places around De Aar, karoo rats and other rodents were found infected. Their dead bodies were both macroscopically and microscopically like those from De Aar, but no plague bacilli were found. The Inspector found that he could transmit the disease to healthy gerbilles by scarifying with material from infected cadavers. The annexes suggest that the disease was not plague or, if due to a *Pasteurella*, it was one differing from *P. pestis*.

J. H. T. W.

NAIDU (B. P. B.), JUNG (Shamsher) & KAMAKAKA (K. H.). **Preparation of a Potent Anti-Plague Serum in India.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1259-1305. [30 refs.] [Haffkine Inst., Parel, Bombay.]

It is interesting to find from the historical introduction of this paper that HAFKINE as long ago as 1897 used the "alternate case" method of assessing the therapeutic results of anti-plague serum. He found that there was "no evidence of any favourable effect attributable to the serum." The contention of the authors, however, is that it requires a plague serum of high potency to afford satisfactory results. This is borne out by their animal experimentation in which comparison, along with untreated controls, was made between their own serum and those obtained from other sources. The mortality in some of the animals used, sheep and calves, is apt to be high. It is astonishing, however, what large intravenous doses of virulent cultures were tolerated in these animals. In both the maximum dose reached was 50 agar slope cultures. Only 3 out of 21 sheep survived immunization

and 1 out of the 2 calves. Rabbits, sheep and calves are all animals in which haemorrhagic septicaemia, caused by a pasteurella organism very similar to the plague bacillus, is a common and fatal infection, whereas in the horse it is not. This fact is taken to be in favour of obtaining a really potent serum from the former animals and of excluding the latter. The agglutinating titre of a serum is considered to be a very good index to its potency as a therapeutic agent. It was found that the anti-plague sera of the Lister Institute, London, and of the Pasteur Institute, Paris, prepared from horses did not cause agglutination with local strains of plague even in a dilution of 1 in 2. Therapeutically the sheep serum prepared by the authors tried out on 100 rats gave a mortality of only 13 per cent. within one week of infection as compared with mortality of 52 per cent. among the 100 rats treated with Pasteur Institute serum and a mortality of 83.3 per cent. among the untreated controls. Results of the same order were obtained by the use of calf serum.

W. F. Harvey.

TSURUMI (Mitsuzo). Sur la destruction des rats et des puces pour la prévention de la peste au Japon. [**Destruction of Fleas and Rats for Prevention of Plague in Japan.**—*Bull. Office Internat. d' Hyg. Publique*. 1929. Oct. Vol. 21. No. 10. pp. 1710-1714. [1 ref.]

This is a statistical paper dealing with fumigation of ships to destruction of rats generally. Tables are given showing the numbers of cases of plague and the number of infected rats in various places.

J. H. T. W.

TSURUMI (Mitsuzo). Epidémie de peste bubonique et septicémique dans la Mongolie intérieure, en 1928. [**Plague in Mongolia.**—*Bull. Office Internat. d' Hyg. Publique*. 1930. Feb. Vol. 22. No. 2. pp. 261-265.

This is an official report of plague in the Chienchiatien region in 1928, 1,333 cases in all. It contains a list of the rodents found, but nothing else of importance.

J. H. T. W.

RABIES : A REVIEW OF RECENT ARTICLES. XIII.*

It will be remembered that it was resolved at the International Conference, held under the auspices of the League of Nations in 1927, that experiments on the relative efficacies of carbolized and etherized vaccines should be investigated at one of the larger Pasteur Institutes. The matter had been taken up some 16 months previously at the institute at Kasauli [India], and a report embodying the first part of these investigations is now presented by CUNNINGHAM and MALONE.¹ It had been claimed that, by the use of etherized vaccines (originally containing attenuated living virus, and later, virus killed by carbolic), the mortality from rabies could be practically abolished even in the case of the severely bitten, and that, in spite of the greatly increased dosage of brain substance employed, post-vaccinal paralyses were of rare occurrence. This naturally inspired workers in India with the hope that it might be possible to effect a reduction in the high mortalities which are found in statistics relating to the treatment of Indians, who form a very severely bitten group, and are consequently at an unduly high degree of risk. The authors review in the first place the Indian experience with dried cords, dilutions, and latterly carbolized vaccines. They then recapitulate their observations upon the resistance of various strains of virus to ether. They emphasize the fact that the Kasauli strain of fixed virus is very much less resistant than the Paris strain. In their tests on the human being the Kasauli strain was employed; both Kasauli and Paris strains were used in their experiments on animals. After immersion in ether for 72 and 84 hours it is shown that a brain infected with the Paris strain contains about 15 times as much living virus as a brain infected with the Kasauli strain.

The observations on human beings relate to 5,007 persons treated with etherized vaccines, and 14,255 treated with carbolized vaccines, that is to a total of 19,262 persons. The population was classified according to a modification of the system used by HEMPT. The dosage in the case of each method—Alivisatos, Hempt, and Semple as the case might be—was very similar to that ordinarily employed. Cases were followed up to six months, the proportion of complete returns received being of the order of 80 per cent.

The results for cases belonging to Hempt's *fourth* class (deep extensive bites, and all bites on head and neck) were as follows :—

<i>Method.</i>	<i>Total dosage.</i>	<i>Number treated.</i>	<i>Deaths.</i>	<i>Mortality per cent.</i>
Alivisatos ...	6-8 gm.	819	40	4.88
Hempt ...	4 gm.	723	46	6.36
Carbolized ...	0.7 gm.	325	28	8.62
Carbolized ...	0.7-1.95 gm.	1,004	81	8.07

* For the twelfth of this series see Vol. 27, pp. 251-263.

¹ CUNNINGHAM (J.) & MALONE (R. H.). An Investigation into the Value of an Etherized Vaccine in the Prophylactic Treatment of Rabies. Part VII. The Comparative Immunizing Value of Semple's Carbolized Vaccine and the Etherized Vaccines of Alivisatos and Hempt (Original Method).—*Indian Med. Res. Memoirs. Supplementary Series to Indian J. Med. Res.* 1930. Mar. Memoir No. 15. pp. vii+215. With 3 charts & 2 figs. on 1 plate. [47 refs.] [Pasteur Inst. of India, Kasauli.]

The only significant difference amongst these figures is in the case of Alivisatos as compared with carbolized, and this difference is such as might be expected to occur once in 143 times on the assumption that the treatments were equally effective.

The results for cases belonging to Hempt's *third* class (superficial bites on fingers, superficial extensive bites on all parts except head and neck, and deep but not extensive bites on all parts except head and neck) are as follows :—

		<i>Number treated.</i>	<i>Deaths.</i>	<i>Mortality per cent.</i>
Alivisatos	... ..	Not tested	—	—
Hempt	... ..	2,003	17	0·85
Carbolized	... ..	6,200	78	1·26

The difference is not significant.

For cases belonging to Hempt's *second* class (superficial but not extensive bites on trunk and extremities, excluding bites on fingers) they found :—

		<i>Number treated.</i>	<i>Deaths.</i>	<i>Mortality per cent.</i>
Hempt	... ..	1,142	6	0·53
Carbolized	... ..	6,200	28	0·45

Again an insignificant difference.

The effect of the variations in methods of treatment upon the *total* mortality has been furnished to the reviewer by CUNNINGHAM. In 1905, when carbolized vaccines alone were used and in the smaller dosage, the mortality at Kasauli was 1·86 per cent. ; in 1926, when only the worst cases of Class IV were treated with etherized vaccines the percentage was 1·94 ; in 1927, when all of Class IV and many of Class III were treated with ether vaccines, it was 1·74, and in 1928, when the same procedure was continued, the mortality was 1·54 per cent.

The conclusion from this part of the research is that Alivisatos' method yielded significantly better results than carbolized vaccines, in the doses employed, and that similarly significant improvements were not observed when Hempt's vaccine was used. That such improvements as have been observed are associated with the quantity of brain substance administered appears from the table for bites of the fourth class. (Observations on the relative efficacies of the various vaccines when given in the same dosage have been undertaken, and, in fact, are now complete. A second report dealing with these will shortly appear.)

The second section of the report deals with experiments on rabbits and monkeys. In these, treatment was given *after* the infecting dose had been administered. Those on rabbits were inconclusive "on account of the high degree of susceptibility of the rabbit." Those on monkeys showed a significant difference in favour of Alivisatos' method, as compared with Semple's, but not in favour of Hempt's. The results which relate to groups of 33 monkeys each, treated respectively

by Alivisatos', Hempt's and Semple's vaccines, and also respectively with Kasauli and Paris strain of fixed virus, are given in the fullest detail with regard to survival and incubation. (The reader is referred to the report, which I understand will be issued to all Pasteur Institutes by the League of Nations.)

The report concludes with recommendations based upon the principles: that treatment should be rendered available to all bitten persons; that delay in commencement of treatment should be avoided; and that the degree of dosage should in each case be proportional to the degree of risk. To meet these requirements the authors propose a scheme of partial decentralization. Subordinate centres would be in charge of a specially trained doctor, who would subdivide cases according to the four classes. Milder cases (Classes I and II) would be treated at subordinate centres by carbolized vaccines; the more severely bitten being sent to the parent institute for more intensive treatment. The nature of the treatment in this latter case will obviously depend upon the results of the second part of the investigation, which have not yet been published. The collection and analysis of statistical records would be a duty of the parent institute. The authors lay stress upon the fact that each case was followed up for six months after completion of treatment, and that complete returns were received regarding upwards of 80 per cent. (87 in the year 1929) of the persons treated. (This numerical statement regarding the following up of cases should be universally followed.) They also point out that at Kasauli 16 per cent. of cases belonged to Class IV, and that, finally, for local reasons, this percentage reached 20.

They observed that as regards both human and animal tests mortalities from street virus are higher at Kasauli than at other institutes in India, and suggest that the street virus of Northern India may be more virulent than that of other parts.

Finally, they record an instance of a strain of street virus which was pathogenic to the rabbit, but not, or scarcely so, to the monkey. Four of five rabbits developed rabies after infection by corneal scarification, whereas only one out of 24 monkeys succumbed to the same treatment.

i. *Virus.*

In a general paper for Spanish readers, REMLINGER² summarizes his views regarding the problems presented by antirabic treatment in tropical countries. He recapitulates his arguments as to the identity of the virus associated with "*oulou-fato*" with that of rabies; he discusses the difficulties of diagnosis of rabies from pathological material, and suggests how these may be minimized; he describes the method of treatment by glycerinated cords, and recommends its adoption under tropical conditions; he reiterates his view that polyvalency of the vaccine is superfluous; and then goes on to consider methods of prophylaxis.

In a group of three papers the identity of the *oulou-fato* of French West Africa with rabies is discussed. DELPY, CAUVIN and RIOU³ consider that

² REMLINGER (P.). Algunas consideraciones sobre la rabia y el tratamiento antirrábico en los países tropicales.—*Medicina Países Calidos*. Madrid. 1930. Mar. Vol. 3. No. 2. pp. 132-137. [8 refs.]

³ DELPY (L.), CAUVIN & RIOU. Contribution à l'étude de la rage en A.O.F. Transmission de la rage du chien (*Oulou fato*) à l'homme et au guépard.—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 635-638. [6 refs.]

the identity is proved: whereas LEGER⁴ holds the view that two viruses are operative, one of which is the ordinary virus of rabies, and the other is not transmissible to man. LEGER bases this view on the fact that certain persons bitten by rabid animals do not succumb to the disease though they have not received treatment. REMLINGER⁵ exposes the fallaciousness of this reasoning, and reiterates his previous arguments, It may be definitely stated that there is no evidence in favour of the very dangerous hypothesis of LEGER.

A report on the characteristics of Tonking strains of street virus is furnished by BABLET and JOYEUX.⁶ It appears that cases of human rabies are frequent in Tonking, that their incubation periods are short, and that treatment fails to protect more often than would be expected. The author contrasts the frequencies of incubation periods in Tonking and in Europe. In Tonking, 77 per cent. of incubations in man (calculated from a total of 58 cases) are less than 31 days, whereas in Europe (BABES) the percentage is about 25. The mean incubation in Tonking is 26 days, whereas in Europe it is 40 days. The mean incubation period in the dog in Tonking is 25 days. The incubations in rabbits inoculated with brains from cases of human or canine rabies are shorter than the usual. Virulence is preserved in glycerine from 25 to 30 days: and the virus resists desiccation for 8 to 10 days. (See also this *Bulletin*, Vol. 24, p. 762.) Tonking strains are thus similar to those of Cochin China. Strains of exalted virulence are frequently met with.

MARIE and URRAIN⁷ have further examined the filtrability of rabies virus, following a technique used by YAOI and KASAI (*Japanese Journal of Experimental Medicine*, 1929, vii, p. 579) in the case of vaccinia. Through a fresh bougie distilled water was passed and thereafter an emulsion of white of egg (3 per cent.) adjusted by means of hydrochloric acid to a pH of 4.8 to 4.6. In every case the filtrate obtained in this manner from fixed virus proved to be avirulent. The authors then turned to the ordinary method, but used as a diluent for the brain material Martin's bouillon at a pH of 7.2 (1 part of brain to 9 parts of bouillon). The emulsion was centrifuged for 10 minutes and the resulting supernatant fluid was filtered under low pressure, in presence of a culture of *Pasteurella*, through a Chamberland L₃ bougie. The filtrate so obtained infected 4 out of 8 rabbits intracerebrally and 6 out of 16 intraspinaly. The authors invariably failed to achieve this result when distilled water was used as diluent.

MUGRAGE⁸ examines the evidence regarding the presence of rabies virus in milk. Although no authentic case of infection of a human being from the milk of a rabid cow has been reported, a case of transmission through the breast milk of a nursing human mother has been cited (MOHLER, J. R.: Rabies or Hydrophobia, Bull. 449, U.S. Dept. of

⁴ LEGER (André). A propos de la rage en A.O.F.—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 907-908.

⁵ REMLINGER (P.). A propos de la rage en A.O.F.—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 167-170. [3 refs.] [Pasteur Inst. of Morocco, Tangiers.]

⁶ BABLET (J.) & JOYEUX (B.). Sur la virulence du virus des rues tonkinois.—*Ann. Inst. Pasteur.* 1930. Feb. Vol. 44. No. 2. pp. 141-147. With 1 text fig. [1 ref.] [Pasteur Inst., Hanoi.]

⁷ MARIE (A. C.) & URBAIN (Ach.). Sur la filtrabilité du virus rabique (virus fixe).—*C.R. Soc. Biol.* 1930. Mar. 21. Vol. 103. No. 11. pp. 866-868. [2 refs.]

⁸ MUGRAGE (E. R.). Milk-Borne Rabies.—*Jl. Lab. & Clin. Med.* 1930. Feb. Vol. 15. No. 5. pp. 460-464. [17 refs.] [Med. School, Univ. of Colorado, Denver.]

Agriculture 12, 1911). The author failed to infect rabbits by means of the milk of three rabid doe rabbits, by intramuscular injection. He concludes that the treatment of persons who have drunk the milk of a rabid cow is not necessary.

BUSSON⁹ has studied the action of ether, dichlorethylene and trichlorethylene on fixed virus. He found, using strains of fixed virus from Cracow and from Paris, that 4 animals, treated with vaccines which had been extracted with ether for 96 and 120 hours, all died of typical rabies; whilst those animals which had been treated with vaccine extracted for 72 hours survived. A similar result was observed with Paris fixed virus which had been extracted with dichlorethylene. From a second series of experiments he found that a fixed virus which was inoffensive when introduced in a single dose subcutaneously or intramuscularly, when given in repeated doses, as is done in antirabic treatment, may cause rabies, if the virus has been extracted with ether or di- or trichlorethylene for 72 hours.

CUNNINGHAM, NICHOLAS and LAHIRI¹⁰ summarize their results on the action of ether on various strains of brain virus as follows:—

Strain.	Passage.	Alive.	Dead.
Indian street	—	48 hrs.	72 hrs.
Kasauli F.V. No. 1	859th	24 hrs.	36 hrs.
Kasauli F.V. No. 2	38th	72 hrs.	84 hrs.
Paris F.V.	1,301st	144 hrs.	168 hrs.

Experiments using cords and contrasting the deep and superficial portions of brain tissue indicated that this varying resistance of the virus is an innate property of the virus itself, and is not due to depth of penetration by the ether. The incubation periods in the rabbit of the 3 strains of fixed virus were all 7 days.

ii. Symptoms. Course of infection.

The statistics relating to 57 untreated and 90 treated cases which terminated fatally are examined by BUSSON.¹¹ In each case a rabbit was inoculated from the brain. Incubation periods in the rabbit from 11 to 21 days were observed in 90 per cent. of cases in the untreated and in 85 per cent. in the treated. Thus treatment of the parent case had no perceptible influence on the incubation in the rabbit. It appeared also that the incubation period in the rabbit was not related to the incubation period in the man with whose brain the rabbit was inoculated. The incubations in rabbits infected subcutaneously were approximately the same as in those infected subdurally; in particular, very short incubations after subcutaneous infection corresponded almost

⁹ BUSSON (B.). Der Einfluss des Aethers und anderer Entfettungsmittel auf das Virus fixe und seine Pathogenität.—*Ztschr. f. Immunitätsf.u. Experim. Therap.* 1930. Vol. 65. No. 5/6. pp. 465-472. [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

¹⁰ CUNNINGHAM (J.), NICHOLAS (M. J.) & LAHIRI (B. N.). The Action of Ether on the Rabies Virus.—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 531-536. With 2 figs. on 1 plate & 1 chart in text. [5 refs.]

¹¹ BUSSON (B.). Experimentelle Studien über das Lyssavirus.—*Zent. f. Bakt. I. Abt. Orig.* 1930. Feb. 3. Vol. 115. No. 5/6. pp. 294-307. [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

without exception to short incubations after subdural injection, and the same was true for long incubations. BUSSON concludes that the length of the incubation period is not so much a quantitative as a qualitative characteristic of the virus. [It may be remembered that, as regards the incubation period in the human case, MCKENDRICK and FOX (*Indian Journal of Medical Research*, 1917, Vol. v, No. 2. p. 413), by examining correlations between incubation period and number of bites, depth of wound, intervention of clothing, effect of cauterization, and nature of biting animal, found no evidence of variation in the incubation period with the degree of the infecting dose.] On the other hand, the length of incubation was found to be increased with earliness in commencing treatment, showing that treatment after infection delayed the onset of symptoms. BUSSON's results would suggest that this delay operates only with respect to the case which is treated, and that the effect is lost on subpassage : in other words, he has found no evidence of any characteristic alteration of the virus as a result of treatment (in the human case).

BUSSON considers that his observations support his view that the virus exists in two forms, one of which is found in the nervous system and is characterized by its shorter incubation, and the other in the glands. In most natural infections the second is operative, but under particular conditions the nerve form may find its way to the glands, and so give rise to infections of shorter incubation.

In support of this view he cites four pairs of fatal cases bitten in each case by a single dog. Three of the pairs were bitten in the same situation ; the first pair, bitten on head and cheek, had incubations of 35 and 43 days respectively ; the second pair, bitten on lip and hand, showed incubations of 48 and 59 days ; the third pair, bitten on hand and arm, incubated in 110 and 121 days ; and the fourth, bitten on hand and arm, incubated in 72 and 35 days respectively. Rabbits inoculated, however, from the latter pair developed symptoms in 11 to 13 days and 14 to 16 days respectively. Thus, taking situation of bite into consideration, there is considerable agreement between the pairs of incubation periods. [A case cited by H. H. KING in the Kasauli report for 1924 may be quoted in this connexion. Seven of at least 81 persons bitten by a single jackal developed rabies in spite of treatment. The localities and incubations in these cases were, respectively, arm 39 days, hand 42 days, hand 43 days, arm 78 days, knee 62 days, foot 43 days, back 48 days.]

[A simpler interpretation of these phenomena would be that the virus of rabies varies from the "street" type at the one extreme to the "fixed" type at the other : that the latter is neurotropic and characterized by short incubations, whilst the former is associated with secretions and gives rise to longer incubations : that gradations between the two types may occur in nature ; and, finally, that the virus tends to remain true to type and to resist abrupt modifications. The phenomena observed by BUSSON can in this way be explained without deviating from views which are generally accepted. The whole question is worthy of close statistical study, when sufficient data are available.]

In the course of three years GLUSMANN, PREDTETSCHENSKAJA and SSOLOWJEW¹² have had the opportunity of studying at the Pasteur

¹² GLUSMANN (M. P.), PREDTETSCHENSKAJA (L. A.) & SSOLOWJEW (J. W.). Beobachtungen ueber kurze Inkubation des Strassenvirus.—*Ztschr. f. Hyg. u. Infektionskr.* 1930. Feb. 17. Vol. 111. No. 1. pp. 49-57. [2 refs.] [Bact. Inst., Kharkov.]

Institute of Kharkov 20 cases of street virus with short incubations. Of these 9 had incubation periods in the first rabbit passage of 5 days, 8 of 6 days, 2 of 7 days, and 1 of 12 days in the first passage, followed by 5 days in the second and third passage. In 8 of the 20 first passages Negri bodies were observed. They also studied 4 cases of human viruses with short incubations. Two of these were in untreated and 2 were cases of rabies treated by Högyes method. The incubation period in the case of the former 2 were 5 days in the first passage. Rabbits inoculated with the brain of the first treated human case showed incubations of 8, 6, 5, and 4 days; and with the brain of the second, incubations of 6 to 7 days. The authors from these observations emphasize the impossibility of differentiating street from fixed virus by the incubation period alone.

An interesting observation is described by SCHNAUDER.¹³ A strain of virus obtained from a dog which died with symptoms of furious rabies was subpassaged through rabbits to the eighth generation, from two to four individuals occurring in each generation. Of the 2nd generation (1st passage) 2 out of 2 rabbits showed symptoms of fury, of the 3rd, 3 out of 4, of the 4th, 3 out of 4, of the 5th, 2 out of 2, of the 6th, 7th and 8th, none out of 2 in each generation. He concludes that the appearance of symptoms of fury depends upon the strain, but that the tendency dies out with repeated subpassage.

LIVON and PLACIDI¹⁴ report a case of rabies in a child of 2½ years, bitten deeply on the face, whose treatment by glycerinated cords was commenced immediately and who developed symptoms on the 9th day after the bite, dying 48 hours later.

iii. Pathology.

BUSSON¹⁵ presents evidence in favour of the accepted belief that in cases of street virus, infection with short incubation, Negri bodies are seldom found (see also this *Bulletin*, Vol. 27, p. 253). He also furnishes evidence in favour of the view that antirabic treatment prevents their appearance. From a survey of 37 cases of rabies in persons who had undergone treatment, he has found that in 42 per cent. the bodies were absent, an observation which he contrasts with the fact that in untreated cases a negative result is very rare. A further observation is that in treated cases with negative result, the proportion of children is unduly high. He believes that this antagonistic action of treatment on the Negri bodies supports the view that the bodies are parasitic in origin, and are not the results of a cell reaction. "If it were a cell reaction, then it is not clear why these reactions, in a case showing definite symptoms and terminating fatally, should fail to make their appearance." He believes in the existence of two types of virus, one occurring in the nervous system, and the other—a lower, more primitive form—which

¹³ SCHNAUDER, F. Rasende Impfwut der Kaninchen.—*Arch. f. Wiss. u. Prakt. Tierheilk.* 1929. Nov. 25. Vol. 60. No. 5. pp. 464-466. [1 ref.] [State Inst. for Vet. Research, Oppeln, Upper Silesia.]

¹⁴ LIVON (J.) & PLACIDI (L.). A propos d'un cas mortel de rage.—*C.R. Soc. Biol.* 1929. Vol. 102. No. 36. pp. 1045-1046. [Pasteur Inst., Marseilles.]

¹⁵ BUSSON (B.). Ueber den Einfluss der Schutzimpfung auf die Ausbildung der Negrikörperchen im menschlichen Gehirn.—*Zent. f. Bakt. I. Abt. Orig.* 1930. Jan. 7. Vol. 115. No. 3/4. pp. 135-139. [Inst. for Protective Inoculation against Rabies, Vienna.]

is shed in the saliva and so causes natural infection. The tendency towards Negri body formation depends on the primitive form rather than on the neurotropic form, for with repeated passage from brain to brain the bodies become more and more scarce.

KONDO and OBANA¹⁶ failed to demonstrate the existence of specific antibodies in the serum of immunized rabbits, using antigens which had been cooked, glycerinated, extracted with alcohol or cholesterinized.

Following REMLINGER and BAILLY (this *Bulletin*, Vol. 24, p. 766), SCHNÜRER and DAVID (Vol. 24, p. 769) and de GEORGES (Vol. 24, p. 229) who found evidence of the development of a local cutaneous immunity in rabies, TORRES¹⁷ obtained similar results in the case of guineapigs treated by friction.

TZEKNOVITZER and GOLDENBERG¹⁸ submit evidence regarding the mechanism of immunization in rabies. They found from their experiments that friction of the skin with living vaccine which had been attenuated by desiccation neither caused infection nor gave rise to an immunity, and that friction with undessicated living vaccine whilst causing infection in 2 out of 10 rabbits, also failed to produce immunity.

With vaccines introduced subdurally their results are summarized as follows. Certain vaccines dried over varying periods failed to infect. Those which were incapable of infecting also failed to confer immunity. A vaccine killed by formol and exhibited in massive doses subdurally, in certain cases (2 out of 5) conferred an apparent immunity. When vaccines were given intrameningeally following the technique of MARIE and MUTERMILCH, they found: that a vaccine attenuated but not killed by ether caused rabies with prolonged incubation; that a vaccine killed by formol conferred immunity (5 out of 9 rabbits with a single vaccination, 7 out of 9 after two vaccinations, and 11 out of 12 after three vaccinations). In the case of the single rabbit which showed no immunity after three vaccinations, the cerebrospinal fluid had been withdrawn when the test dose was given.

From these and other experiments they conclude that the methods of vaccination to be preferred are those which increase the resistance of the haemato-cephalic barrier, which increase the penetration of rabicidal substances, and which provoke the production of defensive substances in the meningeal cavity; that immunity can be conferred by both living and dead vaccines; but that where the vaccine is introduced near the central nervous system the vaccine must be absolutely inoffensive.

From the summary in French of the Russian communication of GANTT and PANOMAREV,¹⁹ it appears that this relates to the same set of

¹⁶ KONDO (S.) & OBANA (K.). Studies of the Complement Fixation Reaction in Rabies.—*Jl. Japan. Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 252-257. [14 refs.] [Vet. Lab., Ministry of Agric. & Forestry, Nishigahara, Tokyo.]

¹⁷ TORRES (Sylvio). Immunitade local na Raiva.—*Rev. Zootechnia e Vet.* 1928. Vol. 14. No. 2. pp. 127-129. [5 refs.]

¹⁸ TZEKNOVITZER (M.) & GOLDENBERG (I.). Contribution à l'étude du mécanisme de l'immunité dans la rage.—*Ann. Inst. Pasteur.* 1930. Mar. Vol. 44. No. 3. pp. 330-339. [7 refs.] [Bact. Inst., Kharkov.]

¹⁹ GANTT (V. C.) & PONOMAREV (A. V.). Sur le mécanisme de la propagation du virus rabique (virus fixe) dans l'organisme.—*Arch. Sci. Biol.* 1929. Vol. 29. No. 3. pp. 239-252. [34 refs.] [In Russian. French summary pp. 253-254.]

observations as were reviewed in my previous summary (this *Bulletin*, Vol. 27, p. 255).

iv. *Methods of Treatment and Statistics.*

In a previous review (this *Bulletin*, Vol. 26, p. 221), the method of VOLTINO and FINOCCHIO in which nucleo-proteids extracted from rabies brains are used as vaccine was described, and satisfactory results were reported. In a second communication²⁰ these authors report similar successes. Of 5 rabbits treated with the vaccine 2 died, whereas of 5 controls all died. In a third experiment the nucleo-proteid vaccine was prepared from a street virus brain. In this experiment, of 3 treated rabbits all survived, whilst of 3 controls none survived. Neutralization of virus with the serum of animals treated by this method was demonstrated. In order to investigate the specific nature of the nucleo-proteids in the vaccine two rabbits were treated with nucleo-proteids obtained from a normal brain; there was no evidence of protection.

From the annual report for 1928 by MALONE²¹ of the Pasteur Institute of India, it appears that of 6,089 persons treated at *Kasauli* 94 died, i.e., a mortality of 1.54 per cent. whilst of 2,485 treated at subordinate treatment centres, 6 developed rabies, i.e., a mortality of 0.24 per cent. The methods of treatment employed at *Kasauli* were Alivisatos' ether vaccine and carbolized vaccine in increased dosage (above), and at the subordinate centres Semple's vaccine in its usual dosage. A comparison of the efficiencies of the two methods of treatment used at *Kasauli* will be published later. The percentage of health returns received six months after completion of treatment was 87. No cases of paralytic accident were reported.

The number of patients treated at *Coonoor*²² during the year 1928-29 was 465, of whom 5 died, i.e., a mortality of 1.29 per cent.; whilst at local centres 4,686 were treated, of whom 65 died, i.e. a mortality of 1.38 per cent.

The method of treatment employed at *Cluj* (Rumania) was described by BOTEZ and ALBON in my former summary (this *Bulletin*, Vol. 27, p. 258). It consisted in administering dried cords along with emulsions heated according to the method of Piscariu. Statistics relating to persons treated in this manner are now presented by BOTEZ²³. Of 12,130 persons treated, 58 have succumbed to rabies, or a mortality of 0.48 per cent. The statistics include 69 wolf bites from which 8 (i.e., 11 per cent.) died.

²⁰ VOLTINO (G.) & FINOCCHIO (M.). Sur l'immunité contre la rage obtenue par le nucléo-protéide.—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia*. Milan. 1929. Dec. Vol. 1. No. 12. pp. 277-280. [Hyg. Inst., Univ., Messina.]

²¹ KASAULI. Pasteur Institute of India. The Twenty-Eighth Annual Report of the Central Committee of the Association and the Audited Accounts up to June 30th 1929. Also the Report of the Director of the Institute for the Year ending 31st December 1928 [MALONE (R. H.)]. Part II.—63 pp. Simla.

²² COONOR, SOUTHERN INDIA. Pasteur Institute. The Annual Report of the Director [IYENGAR (K. R. K.)] together with the Twenty-Second Annual Report of the Central Committee of the Association for the Year ending February 28th, 1929. 1929. Madras.

²³ BOTEZ (M. A.). Quelques données sur les résultats de la méthode de vaccination antirabique employée à Cluj.—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1351-1353. [1 ref.]

v. *Post Vaccinal Paralysis.*

The cause of post-vaccinal paralysis is fully discussed by SCHWEINBURG.²⁴ Since his original publication with KORITSCHONER (this *Bulletin*, Vol. 22, p. 699) the influence of normal brain substance has been investigated by many workers, and has been repeatedly referred to in these reviews. SCHWEINBURG's final conclusion is that it is improbable that these paralyses arise from a single cause. That normal nerve substance is one of the causative factors he has no doubt, and in this connexion he relates an experiment which he carried out with LÖFFLER. A number of animals were inoculated with a series of doses of an alcoholic extract of normal brain substance, diluted in certain cases with saline, and in others with pig serum. A single rabbit belonging to the latter group, developed symptoms of paralysis with ultimate recovery. The clinical history was fully analogous to the human cases which he and KORITSCHONER had previously described. As other workers have given similar doses of pig serum to "hundreds of thousands" of animals without harmful effect, he excludes the influence of the pig serum, and considers that in this case the causal factor was the nervous material. After surveying the results of STUART and KRIKORIAN (this *Bulletin*, Vol. 26, p. 223), and others, he considers that enough evidence has been brought forward to show that nervous substance itself may cause these accidents. He dwells on the fact that with killed vaccines paralyses may occur, though much more rarely than with living vaccines. Whilst he does not consider that the demonstration of the presence of fixed virus in the brains of fatal cases of post-vaccinal paralysis is a proof of any aetiological relationship, he considers it probable that in the majority of such cases, the fixed virus is the primary cause, and that the nerve substance injected along with the virus in some way favours its deleterious action.

The investigation is carried to a further stage by LÖFFLER and SCHWEINBURG²⁵, who have arrived at the conclusion that repeated inoculations of nerve substance weakens resistance against a subsequent infection with rabies. This result was arrived at from experiments on animals which prior to infection had been treated with repeated injections of alcoholic brain extract (to which in certain instances pig serum had been added). In the case of 7 treated and 4 control rabbits, 14 treated and 8 control rats, and 18 treated and 8 control guineapigs, which were treated by fixed virus, "in no case in which the control animal succumbed, did the treated animal survive." In each group the mortality amongst the treated was very much greater than amongst the controls. From a practical point of view it is advisable to give as little nervous substance as possible, or to use means to remove the lipoids of the vaccine.

In a previous paper (this *Bulletin*, Vol. 24, p. 230) BUSSON described a case of paralytic accident in a girl bitten by a dog which survived. The girl was treated on account of undue anxiety, and three weeks afterwards developed tonic spasms. In this case then, the causal factor

²⁴ SCHWEINBURG (Fritz). Ueber die Ursache der Lähmungen nach Wutschutzimpfungen.—*Zent. f. Bakt. I. Abt. Orig.* 1930. Feb. 3. Vol. 115. No. 5/6. pp. 307-314. [30 refs.] [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

²⁵ LÖFFLER (Ernst) & SCHWEINBURG (Fritz). Ueber Virus fixe-Infektion bei sensibilisierten Tieren.—*Zent. f. Bakt. I. Abt. Orig.* 1930. Feb. 3. Vol. 115. No. 5/6. pp. 314-318. [6 refs.] [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

was the vaccinal material. He now describes²⁶ a case of a boy of 13 years, whose skin was abraded by the teeth of an unknown dog. After three days' treatment by Högyes method (in all 12 mgm. of cord), the boy withdrew. Twenty-five days later after a fall, fever developed with pain and stiffness of the muscles of the neck and back. The spinal fluid was sterile. Death supervened. The post-mortem showed softening, oedema and haemorrhage in the cord and brain. Microscopic examination revealed a general picture of inflammatory necrosis with leucocytic infiltration. Neither Negri bodies nor Koch's granules were found. Two rabbits and two guineapigs inoculated intracerebrally, showed symptoms of rabies on the 7th day, as also did the same number after intramuscular injection. On the other hand, a similar number injected subcutaneously remained healthy, a point of importance with regard to the differential diagnosis between street and fixed virus infection. In the brains of none of these animals were Negri bodies found. He maintains that the virus which was recovered was the same as the vaccinal material, but that it differed from it in increased "organo-specific-fixation." He concludes that living virus is not under all conditions inoffensive, but may become pathogenic under conditions which are not yet fully understood.

GUTMANN²⁷ reports two cases of atypical rabies. The first which had been treated by dried cords and carbolyzed vaccine simultaneously, exhibited symptoms of a meningitic nature. Negri bodies were not found. Subpassages in rabbits showed incubations of 16 and 22 days, and in dogs of 12 and 12 days. The second case presented the characters of an ascending paralysis. The treatment employed was that of Phillip. Negri bodies were not found. Passages in 20 rabbits showed incubations of 15 to 19 days. The relation of the second case to post-vaccinal paralysis is discussed. He also describes the case of a man who showed symptoms of an anaphylactic character after the first injection, and draws attention to a cystic body which he saw in the brain of one of the dogs inoculated with the brain referred to in the first case above.

A case, exhibiting the symptoms of the acute ascending paralysis of Landry, is described by PALTHE²⁸. The patient had undergone treatment at Bandoeng (Java). The termination was fatal. The author cites from the earlier literature cases of untreated persons whose symptoms were of a paralytic type. The clinical picture was that either of a true paralytic rabies, or of paralysis after treatment. "It might have been a case of abortive rabies in the sense of Joseph KOCH."

MARQUE²⁹ describes a case of double facial paralysis following treatment by 14 injections of "fresh vaccine." The electrical reactions of the facial nerve, the frontal muscle, and the orbicular muscles of the eyelids and lips are detailed. The patient was an Argentine.

²⁶ BUSSON (B.). Zur Frage der Ätiologie der postvaccinalen Lähmungen nach Lyssa-Schutzimpfungen. Ein Beitrag zur Pathogenese der Impflyssa.—*Klin. Woch.* 1930. Jan. 11. Vol. 9. No. 2. pp. 73-75. [Inst. for Protective Inoculation against Rabies, Vienna.]

²⁷ GUTMANN (L.). Ueber seltene Formen der Wut und ueber Komplikationen im Laufe der Impfungen.—*Zent. f. Bakt. I. Abt. Orig.* 1930. Jan. 7. Vol. 115. No. 3/4. pp. 139-145. With 1 text fig. [18 refs.] [Sanit.-Baet. Inst., Swerdlowsk.]

²⁸ PALTHE (P. M. van Wulften). Rabies onder het beeld der acute opstijgende paralyse.—*Nederl. Tijdschr. v. Geneesk.* 1930. Apr. 26. 74th Year. 1st Half. No. 17. pp. 2108-2114. [15 refs.]

²⁹ MARQUE (A. M.). Accidente paralítico por vacuna antirrábica: diplegia facial.—*Semana Méd.* 1930. Mar. 27. Vol. 37. No. 13 (1889). pp. 806-808. With 3 text figs.

A case of paralysis following a course of treatment at Boston (U.S.A.) by a modification of Semple's carbolized vaccine is reported by BREED.³⁰ The symptoms were weakness and numbness of the legs, difficulty in micturition, headache, drowsiness, diplopia, ptosis, loss of lower reflexes, and fever. Lumbar puncture relieved the symptoms, and a slow recovery followed.

A second case is reported by SMITH and MURPHY³¹ from Providence (U.S.A.), also after the employment of Semple's vaccine. In this the symptoms were those of numbness, difficulty in micturition, loss of reflexes. It was diagnosed as a case of Landry's ascending paralysis following antirabic treatment. Death supervened on the 14th day after the appearance of symptoms. The post-mortem appearances were those of lobar pneumonia, distension of bladder with degeneration of mucosa. The appearances in the brain and cord are described in detail. "The vessels throughout the brain were markedly congested, but the brain itself was grossly negative." as also was the cord.

vi. Rabies in Animals

Further observations on rabies in the cock and in the pigeon, are reported by REMLINGER and BAILLY^{32, 33, 34, 35} (see this *Bulletin*, Vol. 26, p. 736). They show from experiments on 35 animals that in the cock the virus disappears from the site of inoculation in a very irregular manner. In the large majority of cases it is still present from the 7th to the 15th day. This latency is not so great as in the case of the tortoise which is a very refractory animal, nor nearly so short as in susceptible animals. The cock takes its place midway between the two types. It is feebly receptive, the latency of the virus is long as compared with the rabbit and the dog. When symptoms have developed the reactions of defence may still be active, and may lead to recovery. This is an example of the "neuro-infections auto-stérilisables" of LEVADITI.

Full clinical details of 9 cases of rabies in the cock are related. Of these, two were of the furious type, five were characterized by paralysees and two were abortive. In one of the latter symptoms of incoordination supervened, the animal was killed, and subpassages proved the existence of rabies. In the other in which the symptoms were roughness of voice, irregular gait, and difficulty in flying; the bird recovered.

Similar observations on experimental rabies in the pigeon are cited by the same authors. In the case of this bird the virus remains at the site of inoculation from 2 to 4 days. Six cases were paralytic in type, and 6 were abortive showing a tendency to recovery; none developed

³⁰ BREED (William B.). Paralysis following Anti-Rabic Treatment with Case Report.—*New England Jl. of Med.* 1930. Jan. 23. Vol. 202. No. 4. pp. 151-153. [1 ref.]

³¹ SMITH (Joseph) & MURPHY (John F.). Fatal Paralysis following Anti-Rabic Treatment. Report of a Case.—*New England Jl. of Med.* 1930. Jan. 23. Vol. 202. No. 4. pp. 153-154. [2 refs.]

³² REMLINGER (P.) & BAILLY (J.). Sur le comportement du virus rabique dans l'encéphale du coq.—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1165-1166. [2 refs.]

³³ REMLINGER (P.) & BAILLY (J.). Sur le comportement du virus rabique dans l'encéphale du pigeon.—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1167-1168. [Pasteur Inst., Tangiers.]

³⁴ REMLINGER (P.) & BAILLY (J.). Nouvelles observations relatives à la rage du coq.—*Bull. Acad. Vét. de France.* 1929. Oct. Vol. 2. pp. 286-298. [5 refs.]

³⁵ REMLINGER (P.) & BAILLY (J.). La rage du pigeon.—*Ann. Inst. Pasteur.* 1929. Dec. Vol. 43. No. 12. pp. 1543-1559. [7 refs.]

furious symptoms. Negri bodies were invariably present. In exceptional cases the virus may be destroyed by the defensive mechanism—another example of the “*neuro-infections mortelles auto-sterilisables*” of LEVADITI.

MARIE³⁶ reports an interesting experiment on the differences between the sensitivity of the guineapig and of the rabbit. Mixtures of various strains of street virus, together with an equal quantity of fixed virus were prepared, and injected in suitable doses into the brains of 15 guineapig and of 15 rabbits. The fifteen guineapigs all showed symptoms in less than 7 days, and in every case yielded fixed virus as shown by further transmission. Of the 15 rabbits six developed street virus infection after from 13 to 18 days, and nine were infected with fixed virus (9th day) as was shown by subsequent subpassage. It would thus appear that the guineapig has a high susceptibility for rabies virus, in particular for fixed virus.

SCHOENING³⁷ relates a series of experiments on the immunizing properties of formalin, phenol and chloroform killed vaccines. The vaccines were in each case administered in a single dose. The test doses were variously intramuscular and intraocular. He failed to demonstrate an immunity with phenol and formalin vaccines tested intraocularly; his results were irregular with phenol vaccines tested intramuscularly. His best result was obtained from chloroform killed vaccine tested intramuscularly—of 8 vaccinated 5 survived, and 3 died otherwise, whereas of 6 controls, 5 developed rabies, and 1 was killed accidentally. The chloroform vaccine was prepared as follows: 1 part brain triturated with 2 parts of saline; filtered through gauze and chloroform added to 1 per cent.; room temperature 24 hours, then stored in ice-box. The vaccine was found to be alive on the 11th day, but not on the 17th day. It was used after six weeks in a dose of 5 cc. The author points out that a dose of his phenol killed vaccine corresponds to 0.5 grams of brain substance, whereas a dose of the chloroform vaccine contained 1.6 grams, and asks for further experimental study on the efficacy of the latter modification.

BARNES, METCALFE and LENTZ³⁸ submit a preliminary report on experiments relating to the prophylactic vaccination of dogs. In the first place they examined the relative infectivities after injection of street virus intraneurally, intramuscularly, intraperitoneally, intraocularly, intravenously and subarachnoidly on groups of 3 dogs each. They then contrasted the immunizing properties of single doses of four vaccines obtained from different laboratories, using subarachnoid test doses, and employing ten dogs in each case. Their results were alike inconclusive, the vaccinated dogs being not more immune than the controls. The nature of the vaccines is not stated. “Conclusions will not be drawn until a later report.”

The control of rabies in Pennsylvania (U.S.A.) is discussed by MUNCE.³⁹ During 1927, 210 cases of canine rabies were reported,

³⁶ MARIE (A. C.). Sensibilité du cobaye au virus rabique.—*C.R. Soc. Biol.* 1930. Mar. 21. Vol. 103. No. 11. pp. 868-869. [1 ref.]

³⁷ SCHOENING (H. W.). Experimental Studies with Killed Canine Rabies Vaccines.—*Jl. Amer. Vet. Med. Assoc.* 1930. Jan. Vol. 76. New Ser. Vol. 29. No. 1. pp. 25-33. [8 refs.]

³⁸ BARNES (M. F.), METCALFE (A. N.) & LENTZ (W. J.). Investigations of Canine Diseases, with Special Reference to Rabies. Preliminary Report.—*Jl. Amer. Vet. Med. Assoc.* 1920. Jan. Vol. 76. New Ser. Vol. 29. No. 1. pp. 34-52.

³⁹ MUNCE (T. E.). The Control of Rabies in Pennsylvania.—*Jl. Amer. Vet. Med. Assoc.* 1930. Jan. Vol. 76. New Ser. Vol. 29. No. 1. pp. 53-55.

relating to 512 animals and 173 persons bitten. During 1928 the corresponding figures were 214, 2,281, and 172 respectively. In all, 640 positive cases have been reported amongst an estimated population of 700,000 dogs during a period of 2½ years. This low proportion is ascribed to the methods of control employed, viz.:—muzzling, and shooting of unmuzzled dogs during periods when quarantine has been proclaimed.

REMLINGER and BAILLY^{40 41} furnish a further report on the vaccination of animals against rabies in Morocco (see also this *Bulletin*, Vol. 22, p. 704, and Vol. 26, p. 737). The number of dogs which have been prophylactically treated in 1929 is 635. The ether vaccine has been used according to the procedure previously described. All have been observed for from 3 to 5 months. Of these, 52 were inoculated after the bite of rabid animals, and 519 were prophylactically treated. None have developed rabies. In only one case did symptoms of paralysis follow the inoculation, and in this it was difficult to determine whether the accident was due to the vaccine, or to intercurrent infection with distemper. The animal recovered in due course.

vii. Miscellaneous.

A simple method of removing the rabbit's brain is described by SSAVATEJEV.⁴² The head is removed, and the brain substance sucked, under negative pressure, through the foramen magnum, into a sterile vessel. This is corked and weighed and the brain substance is broken up in it by means of glass balls. A glass vessel for storing vaccine is also described.

ITABASHI⁴³ has applied the intraplantar method of inoculation, which has been employed in the case of the viruses of herpes and foot and mouth disease, to the virus of rabies. The method was successful.

Decentralization of antirabic treatment as applied to Chile is described by ORELLANA⁴⁴. The vaccine is prepared according to the method of Fermi, modified in that the suspension is kept at 37° for 48 hours. Ampoules of vaccine are distributed to six subordinate centres.

In the *United States Naval Medical Bulletin* KAUFMAN⁴⁵ reports the treatment at San Diego of 22 men of the United States Navy, who had been in contact with a rabid dog, and LARSEN⁴⁶ describes the measures which were taken in the case of three seamen bitten in China.

A. G. McKendrick.

⁴⁰ REMLINGER (P.) & BAILLY (J.). La vaccination antirabique des animaux et du chien, en particulier, au Maroc en 1929.—*Bull. Acad. Méd.* 1930. Apr. 15. Year 94. 3rd Ser. Vol. 103. No. 15. pp. 397–403. [1 ref.] [Pasteur Inst., Tangiers.]

⁴¹ REMLINGER (P.) & BAILLY (J.). La vaccination antirabique du chien au Maroc.—*Rev. Vét. et J. de Méd. Vét.* 1929. Sept. Vol. 81. pp. 483–491. [9 refs.]

⁴² SSAVATEJEV (A.). Zur Methodik der antirabischen Impfungen.—*Zent. f. Bakt. I. Abt. Orig.* 1930. Feb. 20. Vol. 115. No. 7/8. pp. 464–467. With 1 text fig. [Metschnikov Inst., Moscow.]

⁴³ ITABASHI (K.). Studies on the Intraplantar Inoculation of Rabic Virus. I. Experiments with *Virus fixe*.—*Jl. Japan Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 238–250. [17 refs.] [In Japanese. English summary pp. 250–251.] [Inst. for Infectious Diseases of Animals, Mukden, S. Manchuria.]

⁴⁴ ORELLANA. Descentralización del tratamiento antirrábico.—*Rev. del. Inst. Bact. de Chile.* Santiago. 1929. Vol. 1. No. 1. pp. 39–41.

⁴⁵ KAUFMAN (J. B.). Vaccine administered to 22 Men exposed to Rabies.—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 248–252.

⁴⁶ LARSEN (A. M.). The Use of Rabies Vaccine on Board Ships of the Yangtze Patrol.—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 252–255

BERIBERI.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 3. pp. 423-443. **Report of the Committee on Beri-Beri of the Philippine Islands.**

Beriberi is a prevailing disease in the Philippines. From mortality tables it appears that in 1910, 5,569 patients died from the disease, and in 1926, 19,204. The incidence rate is decreasing in Manila, but slightly increasing in the provinces. During the last three years, both the importation and the local production of rice have increased. There is a connexion between the incidence of the disease and the local production of rice. The labouring classes are most frequently attacked and the highest incidence figures are found between October and January. The average daily outlay of money for food for a family of two adults and three minors is P.1.35; too small an amount to permit of an abundant diet. Various recommendations are given regarding the inspection, care and analysis of rice based upon the findings of VEDDER and FELICIANO (this *Bulletin*, Vol. 25, p. 863).

A. D. Bigland.

- i. NGUYEN-VAN-KHAI. Considérations sur l'épidémiologie du béri-béri dans la province de Tân-an en 1927. [**Epidemiology of Beriberi in Tanan Province (Cochin China).**]—*Bull. Soc. Méd. Chirurg. Indochine*. 1929. Aug.-Sept. Vol. 7. Nos. 8/9. pp. 420-432. With 1 folding map.
- ii. ——. Considérations sur l'épidémiologie du béri-béri dans la province de Tanan en 1927.—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 982-994. With 1 map.

i. In 1925, in the Province of Tan-An, 20 cases of beriberi were reported (11 men, and 9 women). In 1926 there were 19 cases (10 men, 8 women, 1 child), and in 1927 the author observed 331 cases.

A study of this 1927 outbreak suggests that beriberi is a contagious disease. The maximum number of cases occurred in November, those attacked being men and women between 20 and 45 years. The aged and children under 10 seemed to escape and the disease by no means confined itself to the poorer classes. The Province of Tan-An is rich, and there are no famines. It is stated that the beriberi cases showed no evidence of starvation nor of avitaminosis.

On the clinical side the following points may be noted: gastro-intestinal symptoms were very prominent at the onset, and continued throughout the attack; when the laryngeal nerve is involved there is hoarseness of the voice and difficulty in swallowing; the prognosis is bad when the phrenic or vagus is attacked. The present outbreak seemed to be associated with the multiplication of small rice-decorticating factories, though a few cases of beriberi occurred each year before the introduction of decorticating apparatus.

A map of the Province is attached, showing the geographical distribution of the outbreak. Out of 62 villages, 35 produced cases of beriberi.

ii. Further observations show a definite amelioration of the outbreak during 1928 and 1929. In 1928 there were 232 cases, and in 1929 (January to June inclusive) only 22.

A. D. B.

JANTZEN (Walther). **Beriberi.**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass. 1928. pp. 138–143.* [Truxillo Railroad Co. Hosp., Puerto Castilla, Honduras.]

In 1927 the author reported 5 cases of beriberi-like polyneuritis which occurred in Honduras during the years 1925–1927. Previous to this no cases had been noted in this country. Some doubt as to the true nature of this small outbreak was felt as the cases were relatively so few, there was no change in living conditions, and the food was rich in vitamin B. (beans, maize, rice, some meat, bananas and plantains).

During 1928 a change took place. Instead of 5 cases in 3 years, there were 18 cases with typical symptoms (doubtful cases were excluded).

Three cases are described in detail and these are taken as types of the disease. Eight patients presented slight symptoms only, viz. : absent deep reflexes in the legs, some sensory disturbances but no paralyses; six showed paralyses of varying degree, but they never lost the ability to walk. Four showed definite paralyses and were unable to walk. Oedema with nervous disturbances was found only twice, and a case is described in some detail which showed oedema only.

All the cases were Latin Americans who had lived many years in Honduras. The average age of the patients was 37 years, and they were mostly workmen. The disease was only noted in the wet season, August–February, the months of October, November, December, showing the greatest incidence. Ova of *uncinaria* were found in the stools in 13 cases. Malaria was present in some. The diet was apparently fairly rich in Vitamin B.

Treatment consisted in giving strychnine, arsenic and quinine (when necessary) and a special diet of brown bread, green vegetables, fruits, beans and meat. More recently the effect of yeast was tried. The average length of time under hospital treatment was 36 days. No deaths occurred.

The author feels justified in classifying these cases as beriberi, though it is admitted that the clinical findings and etiological factors are not quite in conformity with those met with in outbreaks elsewhere.

A. D. B.

MEGAW (J. W. D.). **Epidemic Dropsy: its Bearing on the Beri-Beri Problem.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927. Vol. 3. pp. 349–360.*

A full account of epidemic dropsy is given. Under the heading of etiology the following points may be noted: The disease is almost certainly confined to rice eaters. Nearly all the sufferers have eaten parboiled rice which had been stored for several weeks or months in a hot, damp place after manufacture. In many outbreaks it was possible to trace the offending rice to one store, though the victims attacked were widely separated. In early cases, if rice is entirely omitted from the diet the disease is cured. As in beriberi epidemics, dropsy occurs usually during the wet season, and after the rains. Infants escape. There is apparently no change in the diet which can account for outbreaks. The disease is probably due to a toxic agent present on the rice before it is eaten.

Clinically, the following are among the usual findings: Oedema, generalized or only of the legs; cardio-vascular weakness; some fever; diarrhoea with vomiting at the onset; peripheral neuritis is a variable

finding; a tendency to haemorrhages in severe attacks; a great tendency to glaucoma during later stages; liability to sudden death from heart failure. This picture is contrasted with that of beriberi, and the resemblance and differences are examined. The author thinks that beriberi may include two or more distinct diseases, and that one of them is probably closely allied to epidemic dropsy. "Pellagra shows many points of analogy with beriberi, it may be worth while to make a comparative study of pellagra and beriberi with special reference to the part played by storage of corn and rice."

A. D. B.

MCCARRISON (R.). **Beri-Beri Columbarum.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 361-371.

The author's work on beriberi columbarum has already been reviewed in this *Bulletin* (Vol. 25, pp. 878-879).

During the course of the discussion which followed upon this paper and the preceding one by Lieut.-Col. MEGAW, some interesting points were raised.

Lieut.-Col. Edward B. VEDDER (Philippine Islands) objected to a toxin as the cause of epidemic dropsy on the ground that if such were present, it should surely be demonstrable, as is botulinus toxin. Since beriberi can be cured by giving extract of rice polishings without changing the diet he is strongly of opinion that this condition is not due to an intoxication.

Dr. B. SHAHA (Bengal) claimed that epidemic dropsy is of infective origin. In support, he quoted the following cases:—

(1) In a multimillionaire's house in Calcutta, the family and the servants had a different food supply except for rice and mustard oil. The master and his family suffered from the disease whilst the servants did not.

(2) An epidemic dropsy convalescent patient moved from Calcutta to a Raja's house at Natore and within a month his whole family contracted the disease. The diet was good and there were no other cases in the neighbourhood. Some relations came to attend upon them and they started the disease in their family 10 miles away.

(3) In the Medical College Hostel among several messes having the same rice and oil, some escaped and some did not.

(4) British troops in Mesopotamia never touched rice, but yet they suffered from dropsy in an epidemic form.

(5) In East Bengal rice is taken at all four meals of the day. The rice is husked, parboiled and a year's supply is imported at a time; i.e., it is exactly similar rice to that eaten in Calcutta—yet no indigenous case of epidemic dropsy has been seen.

Dr. Chuni Lal BOSE (Bengal) was opposed to the view that mustard oil had anything to do with the causation of epidemic dropsy. An outbreak of the disease occurred in a gaol in Upper Burma, and yet the Burmese do not use mustard oil. The Makwaris in Calcutta and Howrah do not take mustard oil, and yet they, too, suffer from the disease.

Lieut.-Col. T. H. GLOSTER, I.M.S. (Madras) described how he had isolated 45 different bacilli from the rices used by McCarrison. None was found in the beriberi rices only and none has had any effect upon guineapigs inoculated with them.

Lieut.-Col. C. A. SPRAWSON, I.M.S. (United Provinces) stated that British troops in Aden take no rice, but only wheat which had been stored for six months or more. A constant series of polyneuritis cases has been noted during the last 30 years. It is suggested that with the abolition of such prolonged storage of wheat the cases might cease.

Major H. STOTT, I.M.S. (United Provinces), while not denying that some beriberi cases are due to deficiency, is of the opinion that a toxin found in stale rice is the cause in others. He cites an outbreak of beriberi among British troops in Lebong where there was no question of deficiency either in vitamin B. or any other dietary component.

Col. R. KELSALL, I.M.S. (Burma) stated that he had known beriberi in Burma for 20 years, and yet when an outbreak of epidemic dropsy occurred at Rangoon he found it clinically a new disease. He quoted a family of well-to-do Bengalese, in which the disease attacked everybody in the family, including the servants, within about 14 days. The dietary was exceptionally good, and there was no deficiency of any kind.

A. D. B.

VERGHESE (G.). **An Investigation of Samples of Rice believed to have been the Cause of Beri-Beri in Burma.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 929-944. [1 ref.] [Summary appears also in *Bulletin of Hygiene*.]

This work was an investigation of possible infection of the rice by micro-organisms, leading to beriberi in those consuming it. Twenty samples of rice associated with beriberi cases were investigated, some of the samples being well polished, while others were only partially so. In all samples the grains had been damaged by milling. Micro-organisms isolated from the rice were not toxic when injected into rabbits or pigeons, but feeding pigeons with the rice produced emaciation and diarrhoea leading to death. Symptoms of head retraction appeared in some though not in all cases. It was possible to infect samples of good polished rice with the micro-organisms from the "beriberi" rice, these samples then producing the above symptoms in pigeons and leading to the death of the birds. In the excreta of pigeons fed on "beriberi" rice, the Gram positive type of bacteria abounded, whereas in healthy pigeons the Gram negative type was predominant. The author believes that the injury to rice grains produced during machine milling is the chief factor in allowing the grains to become infected by micro-organisms during long storage in a warm moist atmosphere. He suggests that these micro-organisms may lead to beriberi by producing toxic products in the rice or by removing a factor such as vitamin B from the grain.

D. C. Harrison.

CANNON (Alexander). **Some Observations on Beri-Beri.**—*Brit. Med. Jl.* 1929. Nov. 9. pp. 852-854. With 2 text figs. [2 refs.]

The author has formed very definite views regarding beriberi, based upon two years' research work on over 600 Chinese patients, and more than 80 post-mortems, together with animal experiments. Some of his conclusions are as follows :

"Beri-beri is a syndrome of the Orient, confined to orientals, chiefly males; seasonal in occurrence ; prevalent during the wet season ; partly infectious ;

a rice 'disease'; and is brought about by three factors. They are: (a) water-soluble vitamin B deficiency; (b) a bacterial infection, closely resembling or identical with the *Bacillus asthenogenes* of Bernard (1919); and (c) Endocrine organ disturbance."

It is stated that a low blood cholesterol content is essential for the occurrence of the beriberi syndrome, and that the "dry" and "dysenteric" forms of the disease are in reality a manifestation of malaria. In acute cases the blood pressure is low, about 80, while the spinal fluid pressure is raised to about 200. Increased sugar tolerance is present. Radiologically in beriberi the pulmonary vessels and the right side of the heart enlarge first, followed later by the left side of the heart. During convalescence, recovery takes place in the reverse order.

"Magnesium sulphate, given daily in doses amounting to 150 grams, administered as twenty-four half-hour doses during the twelve waking hours of the day and repeated, if necessary, on the two following days, together with $\frac{1}{2}$ c.cm. of pituitary extract (B.W. & Co.) twice daily; also hypodermic injections of 1 c.cm. of a 5 per cent. solution of cholesterin in olive oil, given on alternate days for six to ten injections, bring about speedy amelioration of the symptom and sign complex; and, with the addition to the diet of vitamin B, complete the cure. Bernard's serums can also be used with good results."

Professor WANG found that the causal organism gives all the characteristics of "*B. cohaerens*" of Göttheil. In the presence of vitamin B. the organism is aerobic and saprophytic, but in the absence of vitamin B. it becomes anaerobic and pathogenic. It can be grown anaerobically upon equal parts of bouillon and milk and can be found in the peripheral blood during periods of gastric disturbances, and can always be isolated from the spleen. Complement fixation and agglutination tests can be performed successfully.

The pathology of beriberi is discussed more fully in another paper by the same author (see below).

A. D. B.

CANNON (Alexander). **The Pathology of Beriberi.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 263–268.

The following pathological findings are based upon post-mortems in nearly 100 beriberi cases at Hong Kong. The findings are remarkably constant.

Outwardly the body is bloated and rigidity occurs rapidly. The brain is markedly oedematous, the convolutions are flattened and the ventricles are full of fluid. Microscopically, the lymphatics are dilated and there is some vacuolation of the larger cells. The lungs are congested and oedematous. The stomach and intestines show congestion and often ballooning. The liver is congested, cirrhotic, and, microscopically, there is a small cell perivascular infiltration, many eosinophil cells being found. The kidneys are in an "acute parenchymatous stage," and, microscopically, cloudy swelling is present. The bladder mucous membrane is haemorrhagic and necrotic.

In the nerves (vagi, phrenic, intercostal and anterior tibial) three classes of change are described. (1) Cloudy swelling without interruption of continuity in both axis cylinder and medulla. This is found in an early stage and may recover completely. (2) Changes with interrup-

tion of continuity. The medullary sheath is fragmented and the axis cylinder may be full of granules. There is not much functional loss. (3) Atrophic changes in sheath and axis cylinder with interstitial tissue increase. Here function is greatly interfered with. The changes found in groups 2 and 3 indicate a chronic stage of the disease. The vagus and sympathetic nerves are much less affected than those of the periphery.

The arteries show some irregularity of the media with slight fatty change in the intima. Marked tortuosity of the pulmonary vessels is occasionally found. The blood presents relative polymorph leucocytosis with eosinophilia up to 15 per cent. and varying grades of anaemia. The muscles show fatty degeneration, the thyroid gland is enlarged, there is a "reappearance" of the thymus with enlarged lymph glands, the islets of Langerhans are hypertrophied, and the adrenals are hyperaemic and hypertrophied. Among other findings may be noted an occasional slight globulin increase in the spinal fluid, atrophy of the testicles and oedema at the auriculo-ventricular junction. In twenty cases keratomalacia was present.

A. D. B.

SHIROKI (Takeshi). **True Nature of Beriberi and Vegetative Nervous System.**—*Japan Med. World.* 1929. May 15. Vol. 9. No. 5. pp. 141–155. With 1 text fig. [Med. College, Nagasaki.]

Beriberi, according to the author, is a syndrome caused either by lack of vitamin B or increased excitability of the sympathetic-nervous system ("Neurasthenia Sympathica"). By repeated electrical stimulation of the sympathetic nerves in the legs of rabbits a condition resembling human beriberi was produced. By the same means applied to a lactating bitch, a condition like that of human infantile beriberi was brought about in the puppies suckled by her. Symptoms disappeared in the puppies when the electrical stimulation of the mother was stopped.

Experimental animals fed upon a diet rich in vitamin B were resistant to the production of "Neurasthenia Sympathica." The influence of climate, meteorological conditions, age, sex, pregnancy, etc., upon the sympathetic nervous system is correlated with the incidence of beriberi.

The author concludes by stating that repeated electrical stimulation of the sympathetic nerves in rabbits leads to a hyperaemia of the adrenal cortex and hypertrophy of the medullary substance. The resulting production of adrenalin-like substances causes hyperaemia of the lungs and other organs and thus leads to dilation of the heart. Similarly oedema, neuritis, etc., are all signs of "Neuritis Sympathica."

[The English of this paper is so unusual that it has been difficult to interpret the exact meaning of the author.]

A. D. B.

WARING (J. I.). **Beriberi in Infants.**—*Amer. Jl. Dis. Children.* 1929. July. Vol. 38. No. 1. pp. 52–56. With 1 text fig. [4 refs.]

According to VEDDER and also HOOBLER, infantile beriberi is not met with in the U.S.A. SCOTT and HERMANN, however, state that in Louisiana children are known to have acquired the disease. The author describes four cases in Charleston, S.C., which he thinks may be regarded as beriberi, but he admits that if the diagnosis of infantile beriberi can only be applied to nurslings whose mothers have the disease, then his cases will not fit into this category.

Case 1. A coloured infant; first seen when she was 5 weeks old. She had been fed upon a reasonable milk and sugar mixture, but failed to gain weight. First diarrhoea and oedema developed; later she showed a rapid pulse, cardiac hypertrophy and loss of knee jerks. Finally, hepatic enlargement and cardiac failure became manifest.

Case 2. A female coloured infant was aged two and a half months when she first came under medical care. After improper feeding, oedema and absent knee jerks were found. The rapid response to a varied diet, rich in vitamin B., seemed to justify the diagnosis of beriberi.

Case 3. Coloured boy aged one year. He was breast fed for eleven months. After weaning he had eaten nothing but hominy. Poor nutrition, oedema and absent or sluggish knee jerks resulted. After a varied diet and yeast tablets, he recovered, but on omitting the diet he relapsed. A second period of improvement followed the resumption of the diet.

Case 4. Coloured boy aged eight months. He was breast fed for seven months, after which he was given condensed milk and sugar. About three months later oedema developed. Upon a good diet combined with cod-liver oil, orange juice and yeast tablets, he rapidly improved and within twelve days he had gained 1 lb. 9 oz. The urine showed a trace of albumin throughout. The case was somewhat indefinite but probably belonged to the same class as the others.

The author is of the opinion that the last three cases were treated in time to prevent the full development of beriberi.

A. D. B.

GUILLERM (J.). Les troubles du métabolisme dans le bérubéri. [**Disturbances of Metabolism in Beriberi.**].—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 970-981. [Pasteur Inst., Saigon.]

An elaborate series of clinical investigations is here recorded upon Annamite cases of beriberi in order to elucidate the metabolism of the condition. As controls the blood, urine, spinal fluid, etc., of normal natives were taken. The results in beriberi cases may be given briefly as follows:—

Blood—Urea. In acute cases this is markedly increased. In chronic cases the figure returns to normal, even though the disease progresses.

Uric Acid. In acute cases always definitely increased.

Glucose. Hypoglycaemia is the rule.

Cholesterin. Low in the normal Annamite, but lower still in beriberi. The figures, even in the same case, are very variable.

Chlorides. Chloride retention is the rule, more marked in "wet" beriberi.

Calcium, Phosphorus and Alkaline Reserve. All lessened.

Spinal Fluid—Albumin. About normal.

Glucose. Somewhat increased.

Chlorides. Increased.

The ratios between glucose in spinal fluid and in the blood (a constant in health) is raised above the normal figure. .5, while the ratio of chlorides is about normal.

Urine.—Oliguria is the rule. Chlorides and phosphates are diminished. Traces of albumin may be present. Urea is lessened relatively and absolutely.

A discussion of the metabolism of the above substances follows, but the main findings appear to be a constant acidosis and a hypoglycaemia with chloride retention.

A. D. B.

KEEFER (Chester S.). **The Beriberi Heart.**—*Arch. Intern. Med.* 1930. Jan. Vol. 45. No. 1. pp. 1–22. With 4 charts. [24 refs.] [Peiping Union Med. College, Peiping, China.]

The first part of this work deals with beriberi cases which showed signs of cardiac insufficiency. Of the 15 patients in this group, 13 survived. The cardiac symptoms exhibited were dyspnoea and palpitation on exertion, and oedema of the legs (probably cardiac in origin). In 4, the liver was enlarged, in 4 hydrothorax was present, 3 showed pulmonary congestion and 1 had ascites. The average pulse rate was 106 with normal rhythm, but the slightest exertion caused a great increase in the rate. The cervical veins were engorged in 4 patients, and increased arterial pulsation with collapsing pulse were found in 5. In all cases the cardiac dulness was increased both to the right and to the left. Systolic murmurs were heard at the apex and pulmonary area in 10 cases and the pulmonary second sound was accentuated in 10. There was no constant change in the blood pressure. Electrocardiographic examination revealed no characteristic alteration. Radiographically the heart was enlarged. "The enlargement was due to an increase in the right auricle and the right ventricle, the pulmonary artery and the superior vena cava. A decrease in the size of the heart occurred rapidly following a proper therapy."

The cases without cardiac insufficiency showed chiefly nervous symptoms. The pulse rate was lower than in the former group, the E.C.G. observations were essentially the same, and radiologically in two cases the same type of cardiac enlargement as in the other cases was recorded. It is important to note that those who had pronounced nervous symptoms and signs did not show cardiac failure, because they were unable to get about, but in those who are able to walk, there is an added strain on the myocardium with resulting cardiac failure. Any exertion is therefore contra-indicated.

As regards the mechanism of heart failure in beriberi three hypotheses are discussed.—(1) *The Vagus Hypothesis*. There is no evidence to show that paralysis of this nerve leads to heart failure and many patients have heart failure with no signs of vagal involvement. (2) *Hypothesis of Respiratory Paralysis*. This fails to account for those cases of cardiac failure without hydrothorax or diaphragmatic paralysis. (3) *The Water Retention Hypothesis*. Is undoubtedly the one upon which the facts can best be explained. In this hypothesis retention of water is the cause of the cardiac enlargement and of the deficient contractility of the heart muscle. The prompt recovery which results from the giving of an adequate diet and yeast without digitalis is also in favour of this view.

A. D. B.

BELL (P. S.). **Home-Made Yeast as a Treatment for Beri-Beri.**—*Kenya & East African Med. Jl.* 1929. Nov. Vol. 6. No. 8. p. 237.

At the beginning of April, 1929, there were 5 cases of the neuritic type of beriberi in the Tanga Native Hospital. A generous supply of vitamins A, C and D was supplied, but relatively little vitamin B could be obtained owing to commercial yeast being unprocureable. The cases made little or no progress towards recovery. The local, home-made raising agent (made from dried hops) was found to contain typical yeast cells and it fermented sugar. The three worst beriberi cases

were given this preparation in one ounce doses twice daily, two cases being kept as controls. "About the middle of May two of the men were able to be repatriated and the third absconded." The two controls remained in their former condition, but upon being given the home-made yeast they, too, rapidly recovered.

A. D. B.

JANSEN (B. C. P.) & DONATH (W. F.). **Prophylaxis and Cure of Beriberi by Vitamin-Preparations.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 372–374.

In the authors' opinion the most urgent measure for the control of beriberi is research to discover a cheap synthetic anti-beriberi vitamin. This ideal has not yet been attained, but in the meantime three different preparations are made by the medical laboratory at Batavia. (1) One consists of fuller's earth, which has absorbed the vitamin from an extract of rice polishings. A daily dose of one gram will protect a person whose chief food is polished rice and half a gram, or two tablets, is sufficient when, in addition to polished rice, a moderate amount of other food is taken. (2) A solution similar to the above. 1 cc. of this extract contains the vitamin from ± 300 grams of rice polishings. It is especially suitable for infantile beriberi cases. (3) For use in acute cases sterilized ampoules of fuller's earth extract in saline are made. One 2 cc. ampoule contains 1 mgm. of vitamin. These are so little toxic that a mouse can receive a subcutaneous or intravenous dose of 1 ampoule (the usual human dose) without ill effect.

The demand for these preparations is very great; in one month 100,000 tablets were issued to physicians. At present 10 tablets can be delivered for a penny, but it is hoped that in a short time the price can be halved. In order to make these tablets as useful for prophylaxis as for treatment they have been mixed with pure table salt; after 2 months there is no destruction of the vitamin, but further observation is necessary.

A. D. B.

BERNARD (Noël). Note sur la prophylaxie du bérubéri. [**Prophylaxis of Beriberi.**]—*Ann. de Méd. et de Pharm. Colon.* 1929. July–Aug.–Sept. Vol. 27. No. 3. pp. 453–456.

It is recommended that in order to prevent beriberi in oriental countries the native dietary should be reduced with respect to its rice content and that wheat, fresh fish, fats, fresh vegetables and fruits should be judiciously added. When beriberi has actually appeared the first thing to do it to prevent any rice being eaten. In Indo-China a special rice is prepared for native workers which is decorticated in such a manner as to preserve the greater part of the husk, so that it is agreeable to the taste and can be transported long distances. It appears that good results follow this dietary, but the natives find that the rice prepared in this way is too rapidly digested, and does not give a feeling of repletion. Nevertheless, the author finds it unwise to accede to the frequent request that the amount of the ration should be increased.

A. D. B.

NEWCOMB (Clive). **The Water-Content of the Heart Muscle in Beri-Beri Columbarum.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 721-734. With 2 diagrams. [2 refs.] [Pasteur Inst., Coonoor, S. India.]

"The object of the investigation, with which the present paper deals, is to ascertain by chemical analysis whether in beriberi columbarum, induced by diets similar to those in use by human sufferers from the disease, the water-content of the heart muscle is increased, and if so, whether this increase can account for the large size of the heart."

Ninety-six pigeons, in four batches, were fed upon highly milled washed rice with the addition of either dal or ragi. Forty-eight birds, in two batches, were used as controls. Of the deficiently fed birds 84 died of polyneuritis, 8 of beriberi columbarum and 4 from other causes.

The effect of a beriberi diet on the pigeons' hearts is as follows :—

"(1) In the majority of the birds, a diminution in the size of the heart and an increase in the water-content of the heart muscle (polyneuritis columbarum and starvation).

"(2) In a minority of the birds, an increase in the size of the heart, and some increase in the water-content of the heart muscle (beriberi-columbarum). This increase is, however, certainly not greater than, and probably less than, in other pigeons, suffering from the effects of the diet.

"(3) The large heart of beriberi-columbarum is not to be explained by water-retention."

A. D. B.

SASAKI (R.). Sur l'électrocardiogramme dans les cas de béri-béri des nourrissons. [**The Electrocardiogram in Infantile Beriberi.**]—*Oriental Jl. Dis. Infants.* 1929. July. Vol. 6. No. 1. [In Japanese. French summary pp. 16-17.] [Pediat. Inst., Imperial Univ., Kyoto.]

Electro-cardiographic readings were taken from 79 infants suffering from beriberi. The results show a preponderance of the right side of the heart. This phenomenon, in the majority of cases, appears between the twentieth and thirtieth day of the disease and does not disappear for a month or two.

The author is of the opinion that these results show that in infantile beriberi there is not only cardiac dilatation but also hypertrophy.

[Considerably greater detail of the electro-cardiographic findings is given, but these have been omitted as they are of interest only to cardiologists.]

A. D. B.

SASAKI (R.). **The Electrocardiographic Study of Infant-Beriberi. II. The Electrocardiogram of Normal Nurslings and Children in Japan.**—*Oriental Jl. Dis. Infants.* 1930. Mar. Vol. 7. No. 2. pp. 27-29.

Continuing his work on the electro-cardiographic study of infantile beriberi cases, the author here turns his attention to the E.C.G. findings met with among healthy Japanese children. Electrocardiograms were taken of 146 normal children whose ages varied from 20 days to 15 years. The results can only be appreciated by cardiologists and, having little general interest, are here omitted.

A. D. B.

PELLAGRA.

CLUVER (E. H.). **Pellagra among the Maize-eating Natives of the Union of South Africa.**—*Brit. Med. Jl.* 1929. Oct. 26. pp. 751-754. [9 refs.]

Though maize, or mealies, is the chief article of diet among the Bantus of South Africa, pellagra outbreaks are rare; in fact, only three such have occurred. In 1906, 150 pellagrins were found among 3,000 Zulu rebel prisoners; in 1912-13, 60 native inmates of the Pretoria Mental Institution developed pellagra; and a recent outbreak in the Durban prison command in which, up to date, 64 cases have been reported. In addition about 50 sporadic cases have been diagnosed from Natal (including Zululand) and the Transkeian native territory of the Cape Province. The majority of these were Bantus, with some Eurafricans, Indians and only six Europeans. The relative rarity of pellagra in South Africa is probably due to the crude methods of maize grinding employed.

Other cases of pellagra are described, but the main part of this paper deals with the outbreak in the Durban prison command. During the period December 1927-1928, 64 cases occurred, all amongst non-Europeans. "Of the 63 pellagrins of whom detailed information is available, only 2 showed symptoms on admission to gaol; in 25 symptoms appeared within three months of admission; 10 had been in prison three to six months; 8 six to twelve months; 5 one to two years; 13 over two years."

As regards the cause of this outbreak a diet deficiency may certainly be blamed. The prison diet scales are uniform throughout the whole Union, maize is the principal food and P.P. factor is grossly deficient. It is curious that pellagra only occurred in Durban and not elsewhere. The probable explanation is that some contributory factor was present. It is suggested that this factor is to be found in hard work in intense sunlight.

The author recommends that such outbreaks should be prevented by adding to the diet a substance rich in P.P. factor, such as yeast.

A. D. Bigland.

STANNUS (Hugh S.). **Deficiency Diseases in Sierra Leone and Pellagra.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 627-632. [18 refs.]

In 1928 WRIGHT (*West African Med. Jl.* Vol. 2. No. 2) published an article entitled "Diseases due to A and B Avitaminosis in Sierra Leone." In this paper there is described a condition characterized by (1) glossitis, (2) soreness at the angles of the mouth, (3) glazing of skin about the inner canthus, (4) changes in the skin in the region of the vulva and scrotum. Associated with these signs are (a) tremulous tongue, (b) altered knee jerk, (c) paraesthesiae of the extremities, with burning of the feet, (d) dimness of vision. Deficiency in Vitamin A is responsible for the signs in the numbered series and lack of Vitamin B for those in the lettered series. The author recalls other observations on similar or allied conditions.

He contrasts these findings with those noted by himself in his work on pellagra among natives of East Central Africa. He is of the opinion that WRIGHT's cases are in reality "pellagra fruste."

NOGUE (1925) described an epidemic of glossitis among native children at Dakar. Gastro-intestinal symptoms were found in some cases and the diagnosis is suggestive of pellagra, especially as there was a seasonal incidence of the condition and improved feeding relieved it. Somewhat similar outbreaks have been described by JASMIN (1925) in Tunis, by MONTPELIER, CATANEI and COLONIEU (1927) among natives of Algiers and by KATZENELLENBOGEN (1928) in Palestine. Though the glossitis was possibly due to some infecting organism, an accessory food factor deficiency may play an important part in the etiology.

BRADLEY, in Seychelles, has reported a condition known as "decoques." Here, too, soreness of the angles of the mouth together with erythema of the genitalia and variable knee jerks were associated with diet deficiency.

The symptom "burning feet" has been noted elsewhere. DUGDALE (1928) found it associated with neuritis among ill-nourished coolies, and COOPE (1928) described epidemic waves of this condition among Tamil coolies. The possibility of pellagra is again suggested.

The author proceeds to discuss the "neuritis" met with in pellagra and shortly reviews the work on this subject. In addition to a true neuritis there are pathological appearances of more widespread nervous system involvement. In this connexion reference to the observations of H. H. SCOTT in Jamaica is made. This worker described an outbreak of central neuritis among sugar-cane labourers. The disease started with photophobia, inflammation of the eyelids and burning sensations of the mucous membranes of the lips and cheeks, associated with fissuring at the angles of the mouth. Later, these were followed by (a) diarrhoea; or (b) constipation with neuritic symptoms, weakness and failing vision and hearing. SCOTT formed the opinion that this condition was caused by an acute intoxication rather than by a food deficiency.

Stannus believes that pellagra is "one of a number of syndromes produced by the action of a toxin in the absence of Vitamin B." Allied conditions can be explained by variations in the degree of vitamin deficiency, by the rapidity of vitamin withdrawal and by the nature of the toxic factor.

A. D. B.

BOASE (Arthur J.). Report on the Incidence of Pellagra in Uganda.—
Uganda Protectorate Ann. Med. & San. Rep. for Year ended 31st December, 1928. Appendix No. V. pp. 89-94. With 4 figs. on 2 plates.

In 1924 several cases of a condition resembling scurvy, characterized by diarrhoea and oedema, were reported from Luzira and Kampala prisons. A similar outbreak with a high mortality occurred at Mbale prison in 1919. In February 1928 pellagra was first recognized in Uganda. During this year 34 cases were found in four prisons, all in native prisoners. The appearances were typical as evidenced by the clinical account and photographs. Autopsies were performed on four cases at Lira. The author's conclusions are:—

"(a) It has been conclusively shown that pellagra and xerophthalmia

occurred in certain prisons in the Protectorate, and that at these prisons the diet was in accordance with the authorized scale.

"(b) Neither disease was reported from other prisons where food supplies depended to a large extent on local produce.

"(c) An experimental diet, of which the chief features were the introduction of a meat ration and insistence on a daily issue of fresh vegetables, has been tried at Kampala and Luzira prisons with satisfactory results. Pellagra and xerophthalmia are now non-existent at these prisons.

"(d) The dietetic advantages of local produce, notably sweet potatoes, over imported maize flour are clearly established. The utilization of local foodstuffs should therefore be encouraged, and, if revision of the scale of diet is contemplated a greater latitude of choice should be allowed to local authorities. In this connection it appears desirable that each prison should be made selfsupporting and that the first claim on prison labour should be for purposes of food cultivation."

A. D. B.

ROBERTS (Stewart R.). **Pellagra of Today.**—*Internat. Clinics.* 1929. Mar. 39th Ser. Vol. 1. pp. 65-76. With 15 figs. on 12 plates. [14 refs.]

Clinically pellagra may be summed up as "dermatitis, diarrhoea and depression"; economically and socially as "poverty, ignorance and neglect."

In a discussion of the history of the disease the author points out, that though pellagra is endemic in the U.S.A., three epidemics have occurred. The first lasted from 1906-1912; the second from 1914 to 1917, and the third from 1926 to the present. Probably there have been considerably more than half a million cases in the U.S.A. since 1902.

The disease is no respecter of age, cases occurring up to 60 years and over. The age period 20-40 shows the maximum vulnerability. Women are more frequently attacked than men. Practically any disease or condition which lessens food intake or hinders metabolism and absorption may cause pellagra. Thus alcoholism, carcinoma of the alimentary tract, mental strain, etc., play their part.

Acute attacks may occur at any season, though usually at the end of the winter or in the autumn. There are three grades of the disease: the first, termed acute, which is often fatal; the second, or subchronic, with one or more mild attacks during two or three years; and the chronic form which may last from five to thirty years, with mild attacks annually or less frequently.

A very full account of the pellagrous skin manifestations is given, and stress is laid upon the presence of two separate conditions, a dermatitis and a dermatagra, or rough scaly, branny skin. In the discussion of the alimentary and nervous systems there is nothing particular to note, except the author's computation that about 10 per cent. of pellagrins become insane.

The problem of diagnosis is considered under three headings:—

(1) *The pre-pellagrous condition.*—In this there are several chief types:—

"(a) The under-nourished child, youth or young adult, more often female . . . with a restricted diet."

"(b) The young married woman with children, much work," and with insufficient food owing to poverty, disease or some nervous state.

"(c) An older woman near the menopause or after," with diet deficiency. "Severe pelvic laceration and constipation are usually present in this type."

"(d) An emaciated man, usually a drinker or heavy smoker, whose food is apparently merely an incident in life."

(2) *The acute attack.*

(3) *The condition between attacks.*—Here the patient is usually below par, presents some nervous instability and gives a history of acute attacks.

Under the heading of etiology, the author states : "most of us seem to know the cause of pellagra until we really face it, and then it becomes vague and very distant, and we hazily conclude that the cause is over in the cupboard somewhere among the proteins and vitamins that are not there."

The therapeutics of pellagra is most carefully considered. The following are the chief conclusions :—Arsenic is an overrated drug ; psychotherapy is useful to instil hope and to help the patient to eat ; a well-balanced diet should be given with a calorie value of 10 per cent. above that of the patient's ideal weight, and it should contain vitamins, and not less than 2 gm. of protein per kilo of body weight, distributed among meats, milk, eggs and vegetables. Dilute HCl 20–40 minims with meals and tinct. nux vomica in 20 drop doses are recommended, together with one to two drachms of brewer's yeast 2 to 4 times daily.

A. D. B.

GUTHRIE (R. H.). **A Review of Cases of Pellagra admitted to the Boston Psychopathic Hospital from 1922 to 1928 with Special Reference to Alcohol as an Etiological Factor.**—*New England Jl. of Med.* 1929. Aug. 29. Vol. 201. No. 9. pp. 414–420. [10 refs.]

"Fourteen cases of pellagra admitted to the Boston Psychopathic Hospital during seven years ending with 1928 were reviewed. Six cases diagnosed alcoholic psychosis were selected from recent admissions and reviewed for comparison with the group of pellagrins.

"Of the fourteen cases of pellagra, six were profoundly alcoholic ; three gave a history of dietary caprices ; three were known to have lived under economic stress ; one man in advanced years had arteriosclerosis ; and one woman gave an uneventful life history except for a period of mild depression four years prior to the onset of pellagra."

Only 5 of the 14 pellagrins showed improvement or recovery, and 8 died. All the 14 cases showed central nervous system involvement.

Of the 6 cases diagnosed alcoholic psychosis the first two had definite pellagrous signs and symptoms, and in the others the presence of pellagra is at least suggested. The author is inclined to consider this group as abortive pellagra cases, and he finds that they usually rapidly improve if they can recover from the systemic effects of the alcohol.

Whether alcohol, as an etiological factor in pellagra, acts by virtue of its power of destroying appetite or whether it alters the metabolism, digestion and absorption, is not yet clear.

A. D. B.

VISWALINGAM (A.). **Observations on Pellagra and Keratomalacia.**—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 97–103. With 5 figs.

Pellagra in Malaya occurs sporadically only among Chinese field labourers. The disease attacks adult male labourers alone. The first case in the Malay States was diagnosed and reported in 1917.

An account of the clinical appearances and possible etiology is given. It is interesting to note that the Chinese labourers' diet is rich in carbohydrate and very poor in protein and vitamins.

Patients suffering from keratomalacia are usually of the Indian community. This condition is, as a rule, found among children whose diet and that of the mothers during pregnancy and lactation is generally deficient, and more particularly lacking in fat soluble vitamins. As a result of this there is a predisposition to bacterial invasion as evidenced by catarrh of mucous tracts, bronchitis, and diarrhoea. The keratomalacia has an insidious onset beginning with denudation of the corneal epithelium, with later necrosis or secondary infection. Severe damage to the eye results and even blindness.

Definite improvement and, in early cases, complete cure has followed the giving of fresh milk, eggs, fruit, cod liver oil with Parrish's food and gingly oil to the skin. Locally, atropine is instilled into the eye and castor oil, olive oil or very weak yellow ointment is used as routine.

Dr. P. H. MARTIN found a low blood calcium figure in cases of keratomalacia. In one case diet and liver extract brought the blood calcium content back to normal.

A. D. B.

WILSON (William H.). **Note on the Etiology of Pellagra.**—*Brit. Med. Jl.* 1930. Jan. 18. pp. 101-103. [17 refs.]

In commenting upon the outbreak of pellagra described by CLUVER (see above) in the Durban prison command the author refers to the fact that three groups of prisoners in separate Institutions were affected as follows: In the first group of European and short term prisoners, 1.9 per cent. were affected; in the second and third groups of hard labour, 3.8 per cent. and 8.2 per cent. respectively were the figures. The diets received by these prisoners are analysed to see whether they throw any light upon the protein deficiency or vitamin deficiency of pellagra.

In the author's previous work (*Jl. of Hygiene*, Vol. 20, 1921), it is pointed out that available protein in any diet is reckoned as the gross intake of protein less loss in the intestine due to failure of absorption (this loss may be as much as 33 per cent.). When the biological value of protein falls below 40 grams daily for non-labour communities and 45 grams for labour communities pellagra is likely to occur. In the four diets given to the Durban prisoners the biological value of protein figures were only 29.5, 28.5, 14 and 38 respectively. It is not surprising therefore, that pellagra developed, but even so it is remarkable that 10 cases were diagnosed after living on this defective diet for only three months, and that cases had not occurred in previous years. Since two cases were admitted to prison with the disease it is probable that food deficiency to some extent was already present when the diets were begun. These findings are certainly in favour of protein deficiency rather than P.P. deficiency being the cause of the outbreak.

The author next proceeds to criticize GOLDBERGER's theory that pellagra is due to P.P. deficiency. The original experiments of GOLDBERGER have been repeated by other workers and no doubt exists but that a deprivation of B₂ Factor leads to a characteristic dermatitis in rats. It cannot be expected that a disease in man and in animals

should be exactly the same, but the absence of alimentary symptoms in the rats, the fact that the dermatitis is not related to exposure to light and the constant haematuria are certainly not like true pellagra. So, too, in experimental black tongue in dogs the symptoms rather resemble those of acute pellagra, but it is not curable, except in the early stages, by yeast and the work of UNDERHILL and MENDEL suggests that it is due to the absence of carotene. They find that a 5 mgm. daily dose of this substance cures the condition, while lean beef or yeast will not. The theory that pellagra is due to lack of vitamin B₂ needs further confirmation.

Analysis of diets associated with pellagra shows that the less the amount of animal protein present the greater is the likelihood of pellagra. AKROYD and ROSCOE have examined many food stuffs as to their vitamin B₂ content. From their tables the amount of vitamin corresponding to one gram of meat in its natural state can be determined. The following are the estimated figures: Meat, 1; beans (dried), 1.2; whole maize (African), 1.5; milk (natural), 2; maize meal or wheat flour, 2.8. Using these results a series of curative or non-pellagrous diets are compared with pellagra producing ones. The B₂ factor was found to be as high in the pellagra producing diets as in the others. It is therefore concluded that the disease is not due to lack of vitamin B₂, but to protein deficiency. There is, however, some evidence to show that the absence of sufficient B₂ in the diet may cause a secondary protein deficiency.

A. D. B.

WILSON (W. H.). **Recent Views regarding the Etiology of Pellagra.**—*C. R. Congrès Internat. de Méd. Trop. et d' Hyg. Le Caire, Egypte, Décembre, 1928.* Vol. 2. pp. 461-494. With 2 charts. [50 refs.]

The author recapitulates his work so clearly that his summary is given in full.

"In section 1 of this paper a number of institutional diets described by Goldberger and his associates are discussed and are compared with other diets known to have been pro-pellagrous or curative. It is shown that with the exception of two diets (in which yeast and tomato juice supplements appeared to be protective), the protein value gave a sufficient explanation of the results. In the two exceptional cases reasons are given for thinking further investigation is needed before it can be concluded that a vitamin deficiency can be the sole primary cause of pellagra.

"In Section 2 various experimental diets in animals are discussed. Reasons are given for doubting that the conditions produced in dogs and rats correspond to pellagra in man.

"In Section 3 an attempt has been made by classifying the components of various diets and comparing the results with the known pellagra incidence on these diets to correlate the probable vitamin content of the different classes of food-stuffs with the incidence of the disease. No such correlation is found unless animal foods in addition to the high value of the protein are equally rich in the B₂ factor as compared to foods from other sources.

"In Section 4 attention is drawn to the importance of Vitamin B₂ in protein metabolism and the possible bearing of this on the theory of the origin of pellagra among communities in which the protein content of the food is of low value. An attempt is made to harmonise the two views of the etiology of the disease."

The author concludes that: "(1) A study of the food conditions of communities affected by pellagra indicates that the usual essential cause

of the disease is a deficiency in the value of the protein intake. (2) Recently published work on the relation of vitamin B₂ to protein metabolism suggests that in persons living on the border-line of sufficiency in this respect the value of the protein intake would be the determining factor in the incidence of pellagra."

A. D. B.

AYKROYD (W. R.). **The Etiology of Pellagra.**—*Brit. Med. Jl.* 1930. Apr. 5. pp. 647-648. [19 refs.]

The author points out that a recent paper by WILSON (see above) dealing with pellagra etiology "tends to give a wrong impression of some recent researches in connexion with that disease." WILSON has shown that pellagra producing diets are composed of protein of low biological value. The figures for the biological value of proteins were worked out from Thomas' Tables which, it is contended by the author, have never been exactly confirmed and fallacies are apt to arise from the use of them. Thus THOMAS found for milk a value of 100 per cent., while MARTIN makes it only 51. THOMAS assigned a value of 29 per cent. to maize, whereas MCCOLLUM, using Thomas's method and working with pigs, found that zein could cover 73 per cent. of the animals' nitrogen expenditure. MITCHELL, working with rats, gave to maize the value 72 per cent. These and other experiments render it unwise to attach too much importance to current estimations of protein biological value.

In 1920, VOEGTLIN, NEILL and HUNTER showed that great improvement in pellagrins was brought about by giving a 95 per cent. alcoholic extract of ox-liver in daily doses equal to 1 kilo of fresh liver. The extract was practically free from amino nitrogen. GOLDBERGER found that casein (biological value 70 per cent.—Thomas) was useless to prevent the recurrence of pellagra. The undoubted therapeutic value of yeast has led GOLDBERGER to change from his amino acid hypothesis to that of a P.P. factor. Work on black tongue in dogs and experiments on rats seemed to justify GOLDBERGER, but the author states that experiments on rats cannot prove pellagra to be a deficiency disease.

The vitamin deficiency theory of pellagra appears to rest on approved facts, but "It remains to be seen whether the distribution of vitamin B₂ in food stuffs when known more completely will explain the epidemiology of pellagra in man." On this theory an explanation is, however, still wanting as to why the disease does not occur in ill-nourished populations where wheat flour is the staple food and in millet-eating and rice-eating communities.

A. D. B.

PRADOS Y SUCH (M.). Beitrag zum Studium der Pellagra. [**Study of Pellagra.**]—*Klin. Woch.* 1929. Oct. 1. Vol. 8. No. 40. pp. 1862-1864. With 2 text figs. [8 refs.]

The author, working in a mental hospital at Malaga, is of the opinion that pellagra is due to diet deficiency and more especially to deficiency in amino-acid and vitamins, particularly fat soluble D. The pathogenesis of the disease suggests changes in the sympathetic nervous system, suprarenals and in calcium metabolism. Variations in the free acid content of the stomach even in the same case ranging from

achlorhydria to hyperchlorhydria, among other findings, are taken to be a sign of sympathetic hypotonia.

After pigmentation following exposure to ultra-violet irradiations it has been noticed that the blood calcium content rises while the tyrosin and sugar values are diminished. Also, in pellagrous dermatitis a similar great increase in blood calcium was found. Improvement in the skin condition is coincident with a fall in the blood calcium. Investigations concerning adrenalin and tyrosin and pigmentation are in progress.

Treatment with vitamins, especially with a preparation called Nateina, was instituted. Eight tablets of this preparation were given daily. Five cases of pellagra are quoted in detail, with photographs, and in three of these Nateina was exhibited with good results.

A. D. B.

TSCHOLARIA (D.). Zur Frage der Pellgraätiologie [**Etiology of Pellagra.**]—*Nachrichten der tropischen Medizin*. Tiflis. 1929. Sept. Vol. 2. No. 7. [In Georgian script. German summary pp. 552-553.]

In order to investigate the extent and etiology of pellagra in Georgia one village was taken as a sample, every inhabitant being examined. Among 535 inhabitants, belonging to 110 families, there were found 54 cases of pellagra limited to 43 families. For the great severity of this outbreak the author blames a diet poor in proteins and in vitamins.

Among rich families, where meat could be procured four times a week, together with milk, no case occurred. All the cases were found among families which could only afford meat about once in three to four months, the staple diet being apparently maize and wild plums with, rarely, dried salt fish and more rarely still beans. Malaria and ankylostomiasis are contributory factors.

A. D. B.

NASARETIAN (L.). Pellagra in Georgien [**Pellagra in Georgia.**]—*Nachrichten der tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 8. [In Georgian script. German summary p. 617.]

The high epidemic incidence of pellagra in West Georgia demands, in the author's opinion, a number of prophylactic and therapeutic measures. Among half a million inhabitants of the affected districts 50,000 cases of the disease are known to exist. In the first place improvement of the diet of the population and the replacement of maize by wheat bread should be undertaken. Other recommendations are: Improved hospital facilities; a central commission of specialists; improved specialized education of the medical personnel; the distribution of popular literature concerning the disease and a proper organization of the food supply.

A. D. B.

ALSCHIBAJA (K.). Zur Klinik und Therapie der Pellagra. [**Symptoms and Treatment of Pellagra.**]—*Nachrichten der Tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 8. [In Georgian script. German summary pp. 616-617.]

In seven villages of Sugdidi, in Mingrelia, the author found 106 cases of pellagra among 488 sick persons attending for treatment, i.e., 21·7 per

cent. A closer study of these cases shows that in pellagra, besides the classical triad, other manifestations occur which point to a more widespread pathology. In the therapeutics of the disease arsenic holds chief place, combined with a rich and varied diet.

A. D. B.

DJAPARIDSE (P.). Zur Erage [? Frage] der Pellagraepidemiologie in Abchasien. [**Etiology of Pellagra in Abkhasia.**]—*Nachrichten der tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 9-10. [In Georgian script. German summary pp. 703-704.]

There has recently been an increase of pellagra in Abkhasia. Thus, the 1927-1928 expedition found only 0.3 per cent. of pellagra patients among all cases examined, while in the spring of 1929 a similar examination revealed the following percentage incidence of the disease: 7.8 in Gali, 5 in Suchum and Kodori, and 3 in Gudauti. Economically, Gali is the poorest, and Gudauti the richest district. Over three-quarters of the affected persons had consumed inferior, imported maize during the previous two years; their normal diet consists of beans, maize, an extract of sour plums prepared with pepper, fruit and, occasionally, cheese and milk. Meat is very rarely obtained, and during the last two years fruit has been scarce on account of droughts. The author's statistics show that the pellagra incidence is greater on the sea-board, in spite of the relatively better milk-supply, and less in the mountainous districts where grapes are grown. He further cites malaria and ankylostomiasis as contributory causes of the disease.

A. D. B.

DOSTROWSKY (Arie). Ueber Pellagrafälle in Palästina. [**Pellagra in Palestine.**]—*Arch. f. Dermat. u. Syph.* 1929. Dec. 19. Vol. 159. No. 1. pp. 112-123. With 5 text figs. [10 refs.] [Rothschild Hosp., Jerusalem.]

The author describes in detail 5 cases of pellagra and 6 further cases of pellagroid. From his experience it appears that the disease is more widely spread in Palestine than is commonly believed, and that it affects the original stock and immigrants to an equal extent; neither race, sex nor colour seem to enter into the etiological picture. Insufficient and unsuitable diet, especially as regards proteins, is adduced as the cause of the appearance of the disease, but the consumption of maize played no part whatever in the etiology of the cases described. The author concludes with some interesting observations on ultra-violet irradiation: he was unable to find an increase of photo-sensitivity in the cases examined, and in addition stresses the fact that the typical eruption of pellagra is not necessarily confined to those parts which are exposed to the action of sunlight.

A. D. B.

GATSCHETSCHILADSE (J.). Meteorologische Verhältnisse der Jahre 1927, 1928 und 1929 und deren Zusammenhang mit den Missernten dieser Jahre als Material zum Studium der Pellagraätiologie. [**Meteorological Conditions and the Bad Harvests of 1927-1929 in Relation to Pellagra Study.**]—*Nachrichten der tropischen Medizin*. Tiflis. 1929. Vol. 2. No. 9-10. [In Georgian script. German summary p. 703.]

The author describes at length the meteorological conditions of the years 1927-1929 which resulted in poor harvests. The percentage figures

compared with previous normal averages were in these years 87, 97 and 57 per cent. respectively. Not only the maize but other crops also suffered. He is of the opinion that with the institution of other field meteorological stations useful information would be obtained regarding crop statistics. The compilation of a drought-incidence calendar is an urgent necessity.

A. D. B.

BRACE (Robert W). **Pellagra resulting from Self-imposed Deficient Diet.** *U.S. Veterans' Bureau Med. Bull.* 1929. Oct. Vol. 5. No. 10. pp. 794-797.

The patient, a white male, aet. 41, was admitted in September, 1928, to the U.S. Veterans' Hospital, Fort Snelling, Minnesota. In 1920 mitral regurgitation was diagnosed and in 1922 mitral stenosis. In 1923 the first diagnosis of neurasthenia was made. Early in the summer of 1928 what was apparently a pellagrous eruption was noted on the hands and wrists. He gave a history that for several years he had lived on a self-imposed, very much restricted diet, vegetables particularly being reduced. A table of his diet is given, but doubts as to its accuracy are suggested. In addition to the desquamation of the hands there were bullae on the hands and face, a red tongue, diarrhoea, emaciation and hyperchlorhydria. These signs, together with the fact that on a balanced diet with no other treatment he gained 7 lbs. in eight days, led the author to believe that the case was one of pellagra due to vitamin deficiency.

A. D. B.

NICOLAS, LACASSAGNE (Jean) & FROMENT (Roger). Un nouveau cas de pellagre. [**A Fresh Case of Pellagra.**]*—Bull. Soc. Française Dermat. et Syph.* 1929. July. No. 7. pp. 697-698 (R.L. 371-372).

A case is described of a woman, aet. 34, who entered the dermatological clinic at Antiquaille with an eruption on the dorsum of the hands and forearms and with weakness of the legs. The erythema first appeared about Easter, but it had been preceded by digestive troubles and profound anorexia since December. She had never eaten maize, but for more than four months she had lived exclusively on eggs and vin sucrée, the latter in large quantity. In addition to the typical pellagrous eruption, the tongue was red and great weakness and apparently some nervous symptoms were present.

Pellagra is rare in France, but one of the authors has noted 15 cases in the last 20 years. Of these cases only one had eaten maize but all had lived upon an insufficient and one-sided dietary. Alcohol, too, seems to have played a part in the etiology.

A. D. B.

MEYER (Gougerot Jean), OFERLÉ & UHRY (P.). Pellagre et erythème pellagroïde. Formes de transition. La pellagroïde est une pellagre incomplète et atténuée. [**Pellagra and Pellagroid Erythema.**]*—Bull. Soc. Française Dermat. et Syph.* 1929. Nov. No. 8. pp. 1018-1019.

The authors describe a case which in June, 1929, had what they call pellagroïde, that is, an erythema with no other signs of pellagra. Later true pellagra developed with sore tongue, fever, anorexia, intestinal paralysis and death. The etiology is obscure as the patient had lived upon a good diet and had partaken of it freely. Other cases are discussed which bear out the contention that this pellagroid condition is mainly an incomplete and attenuated form of pellagra itself and at any time may develop into it.

A. D. B.

ELLIS (R. W. B.). **Pellagra Secondary to Gastro-intestinal Disease.**—*Amer. Jl. Dis. Children.* 1930. May. Vol. 39. No. 5. pp. 1036-1044. With 2 text figs. [13 refs.] [Children's & Infants' Hosps., & Harvard Med. School, Boston.]

A very full account of the literature dealing with pellagra occurring in cases of gastro-intestinal disease is given. The author describes in detail a similar case in his own practice.

An Italian boy, aet. nine years, sent to hospital for loss of weight, anorexia and diarrhoea of three months' duration. The family lived in Lawrence, Mass. The boy had received the ordinary diet of an Italian family, viz.: macaroni, potatoes and bread. Milk was plentiful and meat and eggs were frequently eaten, but in small amounts. Fresh vegetables were a rarity. He had been apparently quite well up to three months before admission. A symmetrical dermatitis of the hands soon appeared, and later crusted lesions were noted on the face, scalp and neck.

The tongue was slightly reddened, diarrhoea was profuse, but neurological examination was negative. There was a secondary anaemia with lymphocytosis and achlorhydria. Later, a diagnosis of tuberculous enterocolitis was made in addition to pellagra. In spite of high protein diet, yeast, etc., he continued to run a high temperature and he was transferred to a sanatorium where he died in August, 1929. (He was admitted to the Children's Hospital April 30th, 1929.)

The author is of opinion that the tuberculous intestinal disease interfered with adequate assimilation and thus pellagra was caused. He thinks that especially in sporadic cases of pellagra a search should be made for co-existent gastro-intestinal disease, and he warns surgeons of the risk of operating in certain cases lest a pellagra condition should be precipitated.

A. D. B.

CARLEY (Paul S.). **The Use of Dried Brewers' Yeast in the Treatment and Prevention of Pellagra.**—*New Orleans Med. & Surg. Jl.* 1930. May. Vol. 82. No. 11. pp. 740-744. [3 refs.]

Treatment with dried brewers' yeast has been tried upon 176 negro pellagrins in Humphrey's County, Mississippi, since August, 1927. It was found that doses of 1 oz. per diem greatly assisted in allaying the symptoms. Upon the withdrawal of the yeast relapse occurred within a year in about one-third of the cases unless other steps were taken to make good the vitamin deficiency. "A daily dose of one ounce of dried brewers' yeast during the period May to October and half an ounce daily from October to May prevented the recurrence of symptoms of pellagra in all of 38 cases, over a period averaging 13 months."

It is pointed out that the ultimate control of the disease is a matter of dietetic education and that yeast should be used only in treatment or until a well-balanced diet can be instituted.

A. D. B.

GOLDBERGER (Joseph) & WHEELER (G. A.). **A Study of the Pellagra-preventive Action of Canned Salmon.**—*Public Health Rep.* 1929. Nov. 15. Vol. 44. No. 46. pp. 2769-2771. [3 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Eighteen female patients of the Georgia State Sanitarium, Milledgeville, Ga., were maintained over a period, in each case of at least a year,

on a pellagra-producing diet supplemented by six ounces of canned salmon (Alaska Chum) per day. None of the patients presented any symptoms suggestive of pellagra during the period of observation. Canned salmon is, therefore, considered a fair substitute for meat in the areas of pellagra endemicity when the latter is not readily available. Since canned salmon is now known to protect against both pellagra in man and blacktongue in the dog, the hypothesis that one disease is the analogue of the other therefore receives support.

A. F. Watson.

DOROGAN (D.) & CAPRI (M.). Chronaxie et contraction musculaire dans la pellagre. [**Chronaxia and Muscular Contraction in Pellagra.**]—*C. R. Soc. Biol.* 1930. Feb. 14. Vol. 103. No. 6. pp. 449–450. With 1 text fig.

Researches upon chronaxia and muscular contraction carried out in 21 pellagrins, exhibiting various degrees and stages of the disease, revealed the fact that a general muscular hypertonus exists in pellagra similar to that found in paralysis agitans and in post-encephalitic Parkinsonian states. It is probable that in pellagra, as in Parkinsonianism, there is a lesion of the locus niger and globus pallidus giving rise, by absence of inhibition, to a reflex muscular hypertonicity.

A. D. B.

SCOTT (L. C.), TURNER (R. H.) & MAYERSON (H. S.). **Spectrographic Examination of Pellagrins' Sera.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Oct. Vol. 27. No. 1. pp. 27–29. With 1 text fig. [2 refs.] [*Med. School, Tulane Univ., New Orleans.*]

The observation that exposure to sunlight probably causes or increases the erythema of pellagra and a consideration of the skin manifestations of hydra aestivalis, buckwheat disease and other forms of sensitization in animals, suggest the presence of a toxin circulating in the blood in these diseases. The sera of 13 acute pellagrins in the New Orleans Charity Hospital were examined by means of a Hilger Quartz Spectograph in order to see whether haematoporphyrin or similar substance was present in the blood. The authors state that in no instance were they able to find any spectroscopical difference between pellagrous and non-pellagrous serum. Control experiments with normal serum containing traces of haematoporphyrin left no room for doubt that this pigment is not present in the blood of pellagrins. Experiments on urine gave the same negative results.

A. D. B.

ABASCAL (Horacio). Reseña historica y sinonimia de la pelagra. [**Historical Review and Synonymy of Pellagra.**]—*Crónica Méd.-Quirúrg. Habana.* 1930. Feb. Vol. 56. No. 2. pp. 72–75.

The historical part of this article is brief and not very informative in view of the fact that diagnosis some 350 years ago was none too accurate, and many of the names are merely place names, such as Asturias disease, Lombardy eruption and Italic scurvy. The latter part consists of a list of synonyms, mostly Italian, of which there are 42, next French 27, Spanish 8, other countries in smaller numbers. They are tabulated for ease of reference by those interested.

H. Harold Scott.

REVIEWS AND NOTICES.

CAIRO. **Congrès International de Médecine Tropicale et d'Hygiène, le Caire, Egypte, Décembre 1928. Comptes Rendus publiés par M. KHALIL. Volume II. Histoire de la médecine—Maladies internes—Maladies des enfants.** [International Congress of Tropical Medicine and Hygiene, Cairo, 1928.]—pp. vii+1002. With numerous illustrations. 1929. Cairo. [P.T.50]

This is the second volume of the records of an international Congress of medicine held in Cairo in December, 1928, which attracted many interesting people from an extended area, India, Germany and Austria. The official language was French, but the volume contains papers in English, German and Arabic. Three Sections are included in this volume: The History of Medicine; Internal Maladies; Diseases of Children. The history of medicine group contains twelve papers of reasonable length dealing with ancient Egyptian medicine; methods of diagnosing diseases by ancient Egyptians; original contributions to medicine by the Arabians; history of hospitals during the Islamic era, etc. Naturally, the second section contains the largest number of papers; 24 were read at the meetings and 23 others were accepted for publication. Some of these papers will receive further notice in this *Bulletin*. The section devoted to children contains papers on cranial measurements of Egyptian children normal and abnormal, standard development and infant mortality, as well as others dealing with special diseases. There are some interesting illustrations in the historical section, taken from ancient figures and statuettes, showing: hydrocephalus, achondroplasia, rickets and elephantiasis.

J. H. Tull Walsh.

SÃO PAULO. **Terceiro congresso brasileiro de hygiene. Realizado em São Paulo de 4 a 12 de novembro 1926.** [Third Brazilian Congress of Hygiene 1926.]—pp. xi+938. Ill. 1929. São Paulo Editora Ltda. Rua Brigadeiro Tobias Nos. 78-80.

This heavy volume of over nine hundred pages contains the records of the work done at the Congress of Hygiene held in S. Paulo in November, 1926. It has taken three years to edit and publish the papers read and no doubt those who attended the Congress will be glad to see a permanent record. Fortunately, the success of such Congresses does not entirely depend on the output of printed matter. The work of the members of the Congress is divided into twelve Sections: Flies and epidemiology; Purification of water supplies; Value of light and cleaning of houses in preventing malaria; Helminths; Leishmaniasis; Epidemiology in prevention of malaria; Municipal hygiene; Epidemiology and prevention of typhoid; Epidemiology and prevention of leprosy in Brazil; Drainage; Public milk supply; and Welfare of children and formation of sanitary habits. It is quite impossible to consider the papers in detail, and there are none which contain much original matter. At the end of each section there is an article by a sectional editor which reviews the papers read in the Section. The book is illustrated with photographs, maps, charts, etc., and well printed, on good paper.

J. H. Tull Walsh.

TROPICAL DISEASES BULLETIN.

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[No. 10.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

JOHNS (Foster M.). **Cultural Methods and Direct Microscopic Examination in the Diagnosis of Pathogenic Amebas.**—*Southern Med. Jl.* 1930. Mar. Vol. 23. No. 3. pp. 236–237. [7 refs.]

The author's findings give some indication of incidence of infection in Louisiana : of 614 individuals, 50 harboured *E. histolytica*.

Thus :—

199 private patients examined as routine—18 (9 per cent.) infected :

181 medical students—15 (8·3 per cent.) infected :

234 Charity Hospital out-patients—17 (7·26 per cent.) infected.

Non-pathogenic amoebae were encountered—*E. coli* 58 (9·4 per cent.) ; *E. nana* 4 (0·6 per cent.) ; *Iodamoeba williamsi* 6 (0·9 per cent.) ; *Valkampfia lobospinosa* 1.

The 614 specimens of faeces (from as many individuals) were examined culturally and by direct microscopy. Forty-nine positive diagnoses were made by direct microscopy and thirty-nine positive cultures were obtained. One positive culture was obtained with negative microscopic findings.

H. M. Hanschell.

MELENEY (Henry E.). **Community Surveys for *Endamoeba histolytica* and Other Intestinal Protozoa in Tennessee; First Report.**—*Jl. Parasit.* 1930. Mar. Vol. 16. No. 3. pp. 146–153. [6 refs.] [Dept. of Preventive Med. & Public Health, Vanderbilt Univ., & Tennessee State Dept. of Public Health, Nashville.]

In this Tennessee survey, unlike other surveys, the specimens came from persons living in their homes and not in abnormal environment

such as hospital, asylum, or army camp; and mostly from persons under 18 years of age in white rural communities or small towns.

TABLE I.

Incidence of Intestinal Protozoa in Tennessee.

Summary of Survey, July 1 to December 3, 1929.

Basis of one Examination.

Total number of specimens	...	...	...	...	4,987
Total positive for one or more protozoa	...	...	...	...	2,759
Per cent. positive for one or more protozoa	...	...	...	...	55.3

Parasite.				Number positive.	Per cent. positive.
<i>Endamoeba histolytica</i>	...	...	...	861	17.3
<i>Endamoeba coli</i>	...	...	...	1,578	31.7
<i>Endolimax nana</i>	...	...	...	489	9.8
<i>Iodamoeba bütschlii</i>	...	...	...	288	5.8
<i>Chilomastix mesnili</i>	...	...	...	191	3.8
<i>Giardia lamblia</i>	...	...	...	942	18.9

In five families in a backward rural section 23 out of 27 individuals were found to be carriers of *E. histolytica* and of the carriers 17 had a history of bloody diarrhoea. These families were characterized by low intelligence and bad personal sanitation; and evidence from their histories and stool examinations pointed to the mother—the chief food and child handler—as the probable source of spread of *E. histolytica*.

H. M. H.

DOUGHERTY (Mark S.). **Amebiasis in the Southern States.**—*Southern Med. Jl.* 1930. Mar. Vol. 23. No. 3. pp. 251–256. With 1 map in text. [11 refs.]

The author discusses the subject, and sums up that definite conclusions as to the incidence of amoebic infection are not warranted by this study—and he therefore draws none: but calls attention to 221 cases reported as having amebiasis in this survey of the South for 1928.

H. M. H.

FAUST (Ernest Carroll). **The *Endamoeba coli* Index of *E. histolytica* in a Community.**—*Amer. Jl. Trop. Med.* 1930. Mar. Vol. 10. No. 2. pp. 137–142. [9 refs.] [Med. College, Tulane Univ., Louisiana.]

The author lays stress on the fact that the presence of any amoeba in the faeces is indicative of contamination—a fact often overlooked. He shows in this paper that the presence of *Entamoeba coli* and *Endo-*

limax nana are important epidemiologically and clinically. He discusses his tabulated data :—

Comparative incidence of *Endamoeba coli*, *E. histolytica* and *Endolimax nana* in representative groups (corrected to 6 examinations).

Area, Group and Source.	Number of cases.	Number of examinations.	<i>E. coli</i>	<i>E. histolytica</i> .	<i>E. nana</i> .
Peking (Chinese and Foreign), Faust, 1929	13,617	3	24.2	20.3	28.0
Peking (Chinese only), Kessel and Svensson, 1924	368	3	30.9	29.5	40.1
England (convalescent dysenterics), Matthews and Smith, 1919	2,355	6	29.3	13.0	16.6
England (invalided troops), Jepps, 1921	971	6	30.4	23.7	28.6
England (civilian cases), Dobell, 1921	3,146	?	36-54	7-10	9-13
Sweden (hospital cases), Svensson, 1928	611	1	24.7	3.4	18.7
Sweden (asylum cases), Svensson, 1928	1,244	1	85.7	21.4	49.1
Finland (out-patients), Svensson, 1928	159	1	61.5	20.0	36.2
United States miscellaneous groups, Boeck and Stiles, 1923	8,029	1.6	24.5	6.8	22.0
Returned United States overseas troops, Kofoed and Swezy, 1921	2,300	1	43.6	29.1	62.4
United States home service troops, Kofoed and Swezy, 1921	576	1	33.9	9.7	59.1
Minnesota ex-service men, Riley, 1929	ca. 500	3	16.1	1.9	22.0
Wise County, Virginia, Faust, this paper	460	1	55.5	45.4	56.4
New Orleans area, Faust, this paper	172	3	34.0	27.9	16.6

and deduces therefrom that since *E. coli* is present in many of the stools containing *E. histolytica*, the two increasing or decreasing together, the finding of either is an admission of consumption of faeces in some form by the host.

In brief, the presence of *E. coli* in an individual constitutes *prima facie* evidence of faeces consumption and as such is an index, not merely of potential, but of actual infection with *E. histolytica*.

H. M. H.

HEYD (Charles Gordon) & SHEPLAR (Adele E.). **Amoebic Dysentery : its Occurrence in Routine Surgical Practice.**—*Amer. Jl. Surgery*. 1930. Jan. New Ser. Vol. 8. No. 1. pp. 54-57. [Post-graduate Med. School & Hosp., New York.]

A report and discussion of seven cases of amoebic dysentery detected in the course of two years routine surgical practice. The cases were diagnosed by sigmoidoscopy and confirmed by cytological identification. The authors note that a considerable percentage of the population in

all geographical areas of the United States is probably infested with *Entamoeba histolytica*; the majority are relatively free from symptoms, but the supposed symptomless carriers frequently show conditions of impoverished health, or arthritis [*sic*!]. Removal of mucous plug through proctoscope from an ulcerated area had proved the most effective way of obtaining the vegetative amoebae.

H. M. H.

CLAASSENS (J. D. M.). **Chronic Amoebic Dysentery.**—*Jl. Med. Assoc. South Africa.* 1930. May 10. Vol. 4. No. 9. pp. 257-260.

The author gives brief clinical accounts of 11 cases occurring in his practice in one year. He notes as features common to all the cases: (1) peculiar grey facial pallor; swarthy tint of eyelids and circumorbital skin; pinched features; prominent eyes; glazed dead white sclerotics. (2) Intermittent diarrhoea, or obstinate constipation; intermittent asthenia, hypochondria, neurasthenia. (3) Vague abdominal discomfort, neuritis, arthritis, subnormal temperature, fatigue. (4) Enlarged spleen; palpable colon especially on left side, anaemia; and evidence of depression of internal secretions (dry skin, grey hair, premature senility). (5) History of mucus in stools.

Eight of these cases were examined by sigmoidoscope and were found to have diagnostic lesions, in some slight and inconspicuous. The amoebic ulcers were small, round or oval, crateriform with congested margins and lay in an elevation of the mucosa giving a raised undermined appearance. They were empty or contained yellow-grey slough. They appeared to start in the hollows of the bowel wall, e.g., in the depression between valvulae conniventes and in bases of sacculi. Several small, flat, usually pigmented buttonhole scars were present. The intervening mucosa was healthy or comparatively so. In two cases the ulcers were extensive and had run together, but there were islands and bridges of apparently normal mucosa.

H. M. H.

CAMPBELL (William). **Human Amoebiasis: Pathological Aspects.**—*Jl. Med. Assoc. South Africa.* 1930. May 10. Vol. 4. No. 9. pp. 260-262. [6 refs.]

A general survey of the said aspects. The author does not accept BRUMPT'S *Entamoeba dispar*, for he has found that *E. histolytica* virulent for one cat, is frequently not so for another. The action of emetine in curing amoebic dysentery is in no way understood.

The author with GERSHLOWITZ has found, in an as yet limited number of experiments, that the antitryptic activity of blood may be definitely increased for four days following a single injection of emetine. They are investigating further the problem whether the curative action of emetine in amoebiasis may be related to its action in increasing anti-trypsin.

H. M. H.

DELL'AQUILA (Tommaso). Sette portatori di "*Entamoeba histolytica*" su dieci componenti di una famiglia. [**Seven Carriers of *Entamoeba histolytica* in One Family.**—*Policlinico.* Sez. Prat. 1930. July 7. Vol. 37. No. 27. pp. 981-983.]

Further evidence that amoebic dysentery is endemic in the Province of Bologna. A man of 50 years presented himself at a dispensary complaining

of abdominal pain and diarrhoea, 4-5 actions daily. Faecal examination revealed *E. histolytica*, both vegetative and cystic. Six other members of the family of ten were found to be cyst-passers. The only symptoms in these was a looseness of the stools. All were treated by intramuscular injections of emetine hydrochloride and stovarsol by mouth, and are said to have been cured.

H. H. S.

MEDULLA (Candido). Episodio epidemico di amebiasi in Marmarica. (Nota epidemiologica.) [**A Small Epidemic of Intestinal Amoebiasis in Marmarica (Cyrenaica).**]—*Arch. Ital. Sci. Med. Colon.* 1930. Mar. 1. Vol. 11. No. 3. pp. 157-160. [11 refs.] English summary (6 lines) p. 161.

In the 2½ months, May to mid-July, 1929, the author observed 68 cases, all but eight being soldiers in the local garrison. Fifty-two had symptoms of acute dysentery, 8 subacute, 3 chronic, 3 with hepatitis, 1 with symptoms of appendicitis and 1 with noma as a complication. Examination of the faeces of 182 hospital patients revealed the *Entamoeba* in 72, and in 50 of these *Trichomonas intestinalis* also. The population of Marmarica is mainly nomadic and the outbreak was almost certainly due to some carrier.

H. H. S.

KHOURY (Joseph). A propos des déterminations extra intestinales de l'amièbe dysentérique. [**Extra-intestinal Determinations of *E. histolytica*.**]—*Rev. Prat. Malad. des Pays Chauds.* 1930. Feb. Vol. 10. No. 2. pp. 78, 81-82.

The author repeats the conclusions drawn from his large first-hand experience, in Alexandria, of critical examination of urine and sputa from many patients suffering from amoebic dysentery, and not so suffering. Not a few of these had been diagnosed as cases of amoebic bronchitis, amoebic cystitis, amoebic nephritis and the appropriate excretions declared to contain *E. histolytica*. In none could the author find *E. histolytica*. He, rightly, demands parasitological proof; protests against the "proof" by clinical effect of emetine therapy; and incidentally warns of the dangers of administration of emetine *largæ manu*. [Dr. Khoury's valuable observations on this important matter have already received full notice in this *Bulletin*.]

H. M. H.

BERNARD (Etienne). Notions récentes sur l'amibiase pulmonaire. [**Pulmonary Amoebiasis.**]—*Arch. Méd. Chirurg. de l'Appareil Respiratoire.* 1929. Vol. 4. No. 3. pp. 257-266.

This paper though labelled "Revue critique" is in fact entirely uncritical. The only touchstone which can give the distinction "*amoebic*" to primary pulmonary "*amoebiasis*" is not the action of emetine on the lesion and symptoms, but *parasitological proof* that the lesion contained *amoebæ*: and this is still to seek among all the "notions récentes" on "primary pulmonary amoebiasis."

H. M. H.

TADDIA (Leo). Bronchite amebica. Primi casi nella Marmarica Orientale (Cirenaica). [**Amoebic Bronchitis.**—*Arch. Ital. Sci. Med. Colon.* 1930. May 1. Vol. 11. No. 5. pp. 264-270. English summary (4 lines) p. 271. [Inst. of Colonial Path., Univ., Bologna.]

Two cases are described,—the first from Marmarica (Cyrenaica). Both patients suffered from troublesome cough with viscid, mucopurulent expectoration streaked with blood. Tubercle bacilli were not found, but large motile amoebae with engulfed red cells were present. Cysts of *E. histolytica* were seen in the faeces of the second patient only. Treatment by 2 cgm. emetine intramuscularly daily for 10 days brought great improvement; after a second course the cure was complete. [The question of the cells being amoebae is not left in doubt by the author. His words (translated) are: "Microscopical examination of fresh specimens of expectoration showed numerous large amoebae three times the size of a leucocyte, varied in shape, with eccentric nucleus, and protoplasm containing red corpuscles."]

H. H. S.

PETZETAKIS (M.). A propos de l'amygdalite amibienne. [**Amoebic Tonsillitis.**—*Rev. Méd. et Hyg. Trop.* 1930. Mar.-Apr. Vol. 22. No. 2. pp. 79-82. With 1 text fig.

The author repeats the words in which (1925) he recorded his observation in Egypt of acute tonsillitis in infants who developed, soon after the tonsillitis, a dysentery diagnosed amoebic as result of microscopical inspection of unstained stool specimens; and how the tonsillitis disappeared rapidly after emetine injections given for the dysentery; and the failure to demonstrate amoebae in or from the tonsils; and [nevertheless] his conviction that the tonsillitis was amoebic; and, indeed, that the tonsils were a frequent portal of entry for dysentery amoebae, and especially so in infants. He now states he has observed, and that most carefully, many such cases since then; and in this paper records just one other exactly such infant case, its "cure" by emetine injections, and again his said conviction.

H. M. H.

SAAD (B.) Contribution au diagnostic de la dysenterie amibienne par racleage des ulcérations recto-sigmoïdiennes. [**Diagnosis of Amoebic Dysentery by Scraping the Recto-Sigmoid Mucosa.**—*Presse Méd.* 1930. June 4. Vol. 38. No. 45. pp. 763-764.

Reports of clinical cases are given in support of the author's reasoned plea for rectoscopy and microscopical examination of scrapings from the lesions in rectum and sigmoid as the necessary and only sure means of establishing a diagnosis of amoebic dysentery. He, however, approves the dictum that in amoebiasis the localization is above all rectal [and is thus unaware, presumably, of the not few carefully observed cases where amoebic localization was only above sigmoid and rectum.]

H. M. H.

LEE (Y. S.). **Amoebic Liver Abscess.**—Reprinted from *Proc. First Pan-Pacific Surgical Conference, Honolulu, Hawaii. 1929. Aug. 14-24.* pp. 305-310. [3 refs.]

A very interesting survey of 40 cases, all Koreans, 1 female, 39 male (in LUDLOW'S 160 Korean cases, previously reported in 1926, see this *Bulletin*, Vol. 24, p. 355, 18 females, 142 males).

H. M. H.

DE LANGIBAUDIÈRE (Baille) & THAN-TRONG-PHUOC. Note sur l'évolution spontanée d'un abcès du foie. [**Spontaneous Evacuation of Liver Abscess.**]—*Bull. Soc. Méd.-Chirurg. Indochine. 1929. July. Vol. 7. No. 7.* pp. 355-358. With 2 text figs.

The authors report that in Indochina are frequently seen enormous liver abscesses ; yet spontaneous evacuation by the diaphragm-pleura-lung-bronchus route, is rare. Rarer still is spontaneous rupture into the peritoneum. They record here, the rarest case of all—spontaneous opening of the liver abscess through the chest wall.

H. M. H.

BROWN (Philip W.). **Amoebic Abscess of the Liver: Report of Four Cases in the North Temperate Zone.**—*Amer. Jl. Med. Sci. 1930. Feb. Vol. 179. No. 2.* pp. 264-269. [5 refs.]

This group of four cases presents some of the rarer phases of the management of amoebic abscess of liver.

Thus in Case IV there was no positive confirmation of diagnosis of amoebiasis by laboratory methods. The author claims that the history of diarrhoea justified emetine therapy, and that there would not have been so abrupt and spectacular a response had the symptoms been due to a pyogenic infection of the gall bladder or liver. In Case I, aspiration had to be repeated several times—even with emetine treatment the body could not absorb so large an accumulation of pus as was present. In Case III abscess of liver developed in spite of and during thorough antiamoebic dysentery treatment (emetine, yatren, treparsol). In Case II in spite of resection of rib and drainage, the liver abscess ruptured into bronchi. The patient, only just able to keep alive, recovered after treatment by emetine and treparsol.

H. M. H.

DELACROIX (M. J. R.). Amibiase et constipation. [**Amoebiasis and Constipation.**]—*Arch. Méd. et Pharm. Milit. 1930. Apr. Vol. 92. No. 4.* pp. 503-517.

In an interesting paper of careful clinical observations the author gives records of eight illustrative cases. In six of these after one or more attacks of dysentery and/or diarrhoea (dysentery amoebae found at first attack or later), constipation had followed very soon, or after a period of alternating diarrhoea and constipation lasting for months or years.

In two patients, resident in Corsica or Morocco, constipation had set in without any preceding dysentery or diarrhoea (dysentery amoeba cysts found in stools). The author remarks that the growing number of

autochthonous amoebic cases makes this latter group of constipation cases of particular interest. In all eight cases the author found distinct enlargement of the liver. In six (out of these eight cases) the constipation yielded to treatment by emetine and stovarsol.

The pathology of the condition is fully discussed and the author concludes that, according to the length of time the infection has lasted, the constipation is a result of the scarring produced by former amoebiasis; or a direct manifestation of still active amoebiasis, and in this latter case amenable to "specific" treatment.

H. M. H.

CORDIER (V.) & MORENAS (L.). Eosinophilie pleurale symptomatique d'un abcès hépatique amibien évacué par vomique. Constataction d'*Entamoeba dysenteriae* dans l'expectoration. [**Pleural Eosinophilia Symptomatic of Amoebic Hepatic Abscess.**].—*C.R. Soc. Biol.* 1930. May 16. Vol. 104. No. 16. p. 198.

The authors state that presence of eosinophile cells in the tissue around an amoebic lesion is a well known fact. They describe a case of liver abscess in which exploratory puncture of the pleural cavity gave sero-fibrinous fluid containing 8 per cent. eosinophiles, 43 per cent. lymphocytes, 32 per cent. polynuclears, 17 per cent. large mononuclears. The blood showed no eosinophilia. The pus from abscess revealed *E. histolytica* (smears stained by iron-haematoxylin).

H. M. H.

DE LAVERGNE (V.), ABEL (E) & DEBENEDETTI (R.). Eosinophilie pleurale au cours d'un abcès amibien du poumon. [**Pleural Eosinophilia in Amoebic Abscess of the Lung.**].—*Bull. et Mém. Soc. Méd. Hôpit de Paris.* 1930. Apr. 14. Year 46. 3rd Ser. No. 13. pp. 593-599. With 1 text fig. [8 refs.]

A full clinical record is given. The eosinophilia in the pleural exudate was transitory. At the first aspiration there was 85 per cent. eosinophiles. At the second aspiration one week later eosinophiles had fallen to 10 per cent. and the normal lymphocytosis was present instead.

H. M. H.

MYNSSEN (G. E. H. Verspyck). **A Case of Recurrent Amoebic Dysentery, due to a Mechanical Cause.**—*Acta Leidensia (Scholae Med. Tropicae).* 1929. Vol. 4. pp. 191-195.

A man with recurrent attacks of dysentery, during which amoebae were demonstrated in stools. These attacks were accompanied by, or had been preceded by abdominal pains suggestive of appendicitis. In a non-dysentery period (when amoebic cysts however had been found in stools), symptoms of acute appendicitis supervened. An acutely inflamed appendix, on the point of perforation was removed. It contained a small and a large faecal stone. Scrapings of mucosa distal to the stone revealed amoebae as well as many leucocytes. The patient made rapid convalescence. No subsequent dysentery and repeated examinations did not reveal amoebae or cysts in stools.

The author suggests that in cases of recurrent amoebic dysentery difficult to cure, there is the possibility of the lumen of the appendix being shut off from the intestine and a focus of amoebae being cultivated in the back part of the appendix.

H. M. H.

NAUMANN (H. E.). Beitrag zur Behandlung des Leberabszesses bei Amöbendysenterie. [**Treatment of Amoebic Liver Abscess.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. June. Vol. 34. No. 6. pp. 300–302.

The author refers to the work of MÜHLENS, who has shown the superiority of Yatren 105 over emetine in the treatment of amoebic dysentery. In the Hamburg Institute tropical liver abscess had been successfully treated by emetine in combination with Yatren 105: later, FISCHER, in that Institute, had been the first to treat successfully a case of tropical liver abscess by Yatren 105 alone.

During the author's one year's practice in Jérémie, Haiti, he has had to treat acute and chronic amoebic dysenteries and cases of obvious liver abscess. He recounts his first experience of three cases whose condition was that of extreme exhaustion, large tender swelling of liver, irregular pulse, failing heart, bloody stools containing pus and amoebae. Injections of emetine, combined with heart stimulants and infusions of glucose and saline failed to save them. They died of heart failure—and, the author suggests, a heart failure aggravated if not caused by the emetine. In another case, here recorded in some detail, emetine injections had not resolved the swelling and pain of the liver, nor the mucosanguineous diarrhoea. When seen by him there was pronounced irregularity and failure of heart. When he substituted Yatren 105 clysmas and later Yatren pills *per os* for the emetine injections, there ensued rapid and steady improvement to apparently complete recovery.

After this experience he has entirely ceased using emetine. He has had 21 further cases of liver abscess—and cured all by treating with Yatren 105 pills. He is emphatic that these were liver abscess—unquestionable (einwandfrei): and describes three of them in some detail. All were gravely ill and more or less exhausted and emaciated—jaundice, painful large swelling of liver, mucous stools in which were found blood, pus and amoebae, fever; leucocytosis 30,000 to 40,000. Irregular failing heart. They were given (besides other therapy for cardiac failure) Yatren pills. All made good recoveries, physical signs and symptoms due to liver, heart and bowel condition all rapidly disappearing.

As result the author declares that to use emetine is both dangerous and unwarranted.

[Abscess of liver is proclaimed, but, in fact, on the evidence given can be suspected only. The author declares the Haitians' fear of operation, even of "puncture," yet records their submission to hypodermic puncture, e.g., for injection of emetine; and, intravenously, of strophanthin; and no more than that puncturing would demonstrate pus, if there, in a large liver swelling and prove the charge of abscess.]

H. M. H.

MENK (W.). Zur Behandlung der Amöbenruhr. [**Treatment of Amoebic Dysentery.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 200–210 (284–294). With 1 text fig.

After a general survey of the subject, epidemiological and clinical, which offers nothing new, the author reviews again his own experience with Yatren 105, and again emphasizes—quoting cases in support—its economical and therapeutical superiority over emetine and emetine-

bismuth therapy for all types of amoebic dysentery. The records of Dr. Menk's work on which this claim is based have all from time to time received due notice in this *Bulletin*.

H. M. H.

MAJUMDAR (Akhil Ranjan). **The Use of a Standardised Preparation of the Total Alkaloids of Kurchi Bark in Amoebic Dysentery.**—*Indian Med. Gaz.* 1930. Feb. Vol. 65. No. 2. pp. 80–84. [4 refs.]

The author reports on a further series of 34 cases treated orally with a standardized preparation of kurchi bark—an alcoholic extract yielding 1 per cent. total alkaloids and not more than 0.25 per cent. tannin [*ante*, p. 388]. Daily dose 6 drachms to 1 ounce, containing 3 to 4 grains total alkaloids. Though even double this quantity is well tolerated, it was found that 3 to 4 grains daily sufficed, provided that not too much of it was evacuated in the stool. All 34 cases showed motile vegetative forms of *E. histolytica* in the stools before treatment.

	Cases.	Deaths.
1. Pure amoebic dysentery	23	5
2. Amoebic dysentery, complicated with bacillary dysentery (mostly Flexner bacillus infections) ...	9	4
3. Amoebic dysentery, complicated with pulmonary tuberculosis	2	2
Totals	34	11

Results are not as bad as they appear to be, for the patients were street beggars, extremely poor, devitalized to an extreme limit, and usually in advanced cachexia. If stools were more frequent than 10 in 24 hours, some binding medicine, e.g., creta, kaolin, bismuth carbonate, sometimes with tinct. opii, was given in order to secure retention of the kurchi preparation for a sufficiently long time. The stools of the recovered cases were free from amoebae. The author concludes that ACTON, KNOWLES and CHOPRA are to be congratulated on having established on a scientific basis the value of this time-honoured remedy for dysentery in India. Acute cases of intestinal amoebiasis should be treated by intramuscular injections of the total alkaloids of kurchi—grains 2 daily; or orally 3 to 4 grains daily; treatment continued for 7 to 10 days. Subacute or chronic cases may be treated orally with tablets of total kurchi alkaloids, 3 to 4 grains daily; or (ACTON and CHOPRA) of kurchi bismuthous iodide 4 grains (2.6 gr. total alkaloids), twice daily, for ten days.

The author hopes that kurchi in standardized extract, and in a standardized preparation of the total alkaloids, may be incorporated in the British Pharmacopoeia.

H. M. H.

BIGGAM (A. G.) & ARAFA (M. A.). **The Effect of Rivanol in the Treatment of Amoebic Dysentery.**—*Lancet.* 1930. June 21. pp. 1335–1339. [9 refs.]

A record of observations carefully and critically made, of great value, for extravagant claims have already been made for the efficacy of rivanol in amoebic dysentery. The authors have very fully set out their observations, careful clinical descriptions being given of their 13 cases, with results of repeated sigmoidoscopy and stool microscopical examinations. The best summary is their tabulated results.

Table showing Result of Treatment by Rivanol in Amoebic Dysentery.

No.	Amoebic ulcers seen by sigmoidoscope.	Entamoebae present in sigmoidoscopic scrape.	Entamoebae in stools (lab. or ward).	Treatment (rivanol in grammes).	Result of Treatment.
1	+	+	—	0.025 t.d.s. 17 days	Relapse after 2 months entamoebae + ulcer present.
2	+	+	+	$\left\{ \begin{array}{l} 0.025 \text{ " 1st week} \\ 0.05 \text{ " 2nd " } \\ 0.075 \text{ " 3rd " } \end{array} \right.$	After a week's rest entamoebae present in stools.
3	+	+	+, also trichomonas.	$\left\{ \begin{array}{l} 0.025 \text{ " 1st " } \\ 0.05 \text{ " 2nd " } \\ 0.075 \text{ " 3rd " } \end{array} \right.$	After a week's rest entamoebae +.
4	+	+	+, also Lambliæ.	0.025 " 10 days	Stools showed entamoebae.
5	+	+	+	0.025 " 18 "	Stools still + for entamoebae.
6	Very small ulcer	+	+	0.025 " 10 "	Stools still + for entamoebae.
7	Small ulcer +	+	+	0.025 " enema	Stools + for entamoebae.
				1 : 10,000 (1 week, then enema stopped) continued per os 0.025 t.d.s. for 12 days.	
8	+	+	+	0.025 t.d.s. 1st week	Entamoebae + and ulcers healed. Relapse 2 months later with large ulcers and many amoebae.
				0.05 " 2nd "	Ulcer healed. No symptoms for 6½ months.
9	One small ulcer	+	+, also Lambliæ.	0.025 " 20 days	Negative entamoebae still negative 2½ months later.
10	Normal membrane, only sticky mucus.	—	+	0.025 " 10 "	Negative entamoebae still negative 2½ months later.
11	Very small ulcer +	+	+, also Morgan.	0.025 " 9 "	Local irritation compelled stoppage of treatment.
12	+	+	+	Enema 1 : 2,000, stopped after 1 week local irrigation.	
				Rivanol 0.025 t.d.s. : 9 days' wash 1 : 10,000 m.e. 9 days	
13	Punched out ulcers + diffuse inflammation	+	+, also Flexner.		Same appearance of ulcers as on admission. Entamoebae still present.

Average duration of Symptoms and Signs after starting Rivanol Treatment.

Days	...	Blood.	3.3	Mucus.	3.3	Tenesmus.	3
			
				...	...	Diarrhoea.	5

They conclude that rivanol in 1 : 2,000 solution per rectum is irritating to the gut mucosa. In 1 : 10,000 solution it is not lethal to the entamoebae. Administered orally even in doses as high as 0.075 gm. thrice daily, it has no toxic effect on patient nor marked lethal effect on the entamoebae.

Rivanol procures great relief from symptoms; tenesmus, blood, mucus, diarrhoea disappear, usually to return shortly after stopping the rivanol.

They consider that the antispasmodic and antiseptic action of the drug may with advantage be utilized for the relief of colic and tenesmus, and for assisting in cleansing the bowel of some of the superadded infection in various dysenteric conditions where lower bowel symptoms are a marked feature of the disease.

H. M. H.

URCHS (O.). **The Treatment of Amoebic Dysentery with Acridin Dyes.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 512-516. With 1 chart. [2 refs.]

This paper reports observations by the author and by PETER (recorded elsewhere and noticed in this *Bulletin*, Vol. 26, p. 876) claiming rivanol (ethoxydiamino-acridin-lactate) as an effective remedy for *E. histolytica* infections. Further, the isolated colon of the rat was poisoned with pilocarpin 10^{-6} . The simultaneous spastic contraction was released by papaverin 10^{-5} . Rivanol 10^{-5} served exactly the same use. It is therefore a powerful antispasmodic, releasing spastic contraction of colon, without the disadvantages of an alkaloid of opium.

H. M. H.

ZORATTI. Note sur le traitement de la dysenterie amibienne par l'auremétine. [**Treatment of Amoebic Dysentery by Auremetine.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Dec. 31. Vol. 9. No. 4. pp. 425-428.

Four African natives with dysentery, *Entamoeba histolytica* found in stools: treated by auremetine and stovarsol by mouth; emetine enemata and, after stools were free from amoebae, by bismuth subnitrate by mouth: after the method recommended by WILLMORE and MARTINDALE. Three were cured: one died before the stools became amoeba-free. He had received 0.75 gm. auremetine, 0.75 gm. stovarsol and two enemata of emetine.

H. M. H.

NUBERT (Gr.) & BRANISTEANU (D.). L'émétine comme traitement des suppurations pulmonaires non amibiennes. [**Emetine in Treatment of Non-Amoebic Abscess of Lung.**]—*Presse Méd.* 1930. Jan. 29. Vol. 38. No. 9. pp. 132-134. With 2 text figs. [16 refs.] [Therap. Clinic, Jassy, Rumania.]

Brief clinical records of six cases which demonstrate that treatment by hypodermic injections of emetine hydrochlor. was followed by

apparent cure of one case of non-amoebic abscess of lung with foetid bronchitis. It failed to cure another case of non-amoebic abscess of lung, but abolished the foetid bronchitis. In four other patients with foetid bronchitis the emetine injections procured rapid disappearance of the foetor, marked diminution of the bronchial secretion, and improvement in the general condition. [So much for the proof of amoebiasis by results of "specific" emetine therapy.]

H. M. H.

SAUTET (Jacques). Contribution à l'étude de la dysenterie amibienne expérimentale chez le chat. [**Experimental Amoebic Dysentery in the Cat.**—*Rev. Méd. et Hyg. Trop.* 1930. Mar.-Apr. Vol. 22. No. 2. pp. 67-72. [3 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The author reviews the subject, records some experiments of his own, and concludes therefrom that :—

Inoculation into kittens of amoebae from cultures is valueless, for sometimes cultures of *E. histolytica* definitely pathogenic for man fail to infect the cat. Amoebae recovered from cases of subacute or chronic or chronic dysentery seem to fail more often to infect the cat than those from a case of acute dysentery.

Dysentery amoebae inoculated into the kitten by the same experimenter with the same technique can give positive or negative results. Very often the kittens die of diarrhoea of undetermined origin or of pulmonary lesions in nearly the same time as those that die of a typical dysentery. So that in practice the doctor who seeks for diagnostic certainty by inoculation of patients' faeces into the kitten may fail to gain that assurance. Moreover, besides the difficulty in interpreting experimental results, there is the not negligible difficulty for the laboratory of procuring kittens.

H. M. H.

DESCHIENS (R.) & KIPCHIDZÉ (N.). Culture d'*Entamoeba dysenteriae* sur un milieu à base de gélose de Musgrave. [**Culture of *E. histolytica* on a Musgrave's Agar Medium.**—*C.R. Soc. Biol.* 1930. Jan. 31. Vol. 103. No. 4. pp. 226-228.]

(1) *Solid portion* (5 cc. for a tube) : agar 20 gm. ; NaCl 5 ; beef extract, 2 to 5 ; aq. destill. 1,000 cc. Solidify in inclined tube ; pH about 7 ; must not be above 7.

(2) *Liquid portion* (5 cc. for a tube) : Ringer's solution, or saline 6 parts in 1,000, pH 7 to 7.6.

(3) To each tube add 0.02 gm. of powdered fish or powdered beef muscle (fragments 5 to 100 μ), and 0.02 gm. rice starch. Powdered fish, beef, and rice starch must be sterilized first by dry heat 110° C. for 10 minutes.

On the medium made up from these three portions the authors have obtained successful cultures of *E. histolytica* ; *E. gingivalis* ; *E. coli* (poor growth) ; an amoeba from a monkey's mouth of *gingivalis* type ; and one from a monkey's gut of *dysenteriae* type.

H. M. H.

BACILLARY DYSENTERY.

PRATT (Thos. A.) & FREW (Hugh W. O.). **A Clinical Account of an Outbreak in Glasgow of Bacillary Dysentery.**—*Glasgow Med. Jl.* 1930. Feb. Vol. 113. No. 2. pp. 82–83.

Thirty-six cases admitted to hospital during August, September, October, 1929. All occurred in same neighbourhood, many in same street; 16 cases were removed from the same tenement. There were 17 females, 19 males; greatest incidence in age group 1–10 years, the most frequent age group 1–6 years. Of 25 cases bacteriologically examined, 19 were positive for *Bact. dysenteriae* Flexner; of 6 primarily negative cases two were later found to be positive. One nurse in attendance developed dysentery, with marked prostration, headache, vomiting, abdominal pain and severe diarrhoea with blood and mucus in stools; but with no rise of temperature. Otherwise the cases were mild.

H. M. H.

HAY (Hilda R.). **Fatal Epidemic Enteritis due to *B. dysenteriae* Sonne.**—*Jl. Hygiene.* 1930. Apr. Vol. 30. No. 1. pp. 25–31. [9 refs.]

Description of an outbreak of dysentery, in Glasgow, in infants—of seven cases all died—proved bacteriologically to be due to Sonne's bacillus. In two cases the diarrhoea was choleraic. No non-lactose fermenting organisms were found in the milk supply, which was the same as that given to other infants elsewhere who did not develop dysentery. Examination of four batches of milk was negative.

There was a close resemblance between the Sonne dysentery as it affected the infants in this epidemic and as it affected the rabbits and guineapigs inoculated with the isolated organisms. The assumption made clinically that *Bact. dysenteriae* (Sonne) caused lesions in the small rather than the large intestine was corroborated by the animal experiments, the resemblance being most striking in animals which survive inoculation long enough to develop lobular pneumonia. The two strains isolated during the epidemic were apparently of high virulence, for relatively small doses were lethal to the animals used.

H. M. H.

MANSELL (H. E.). **Four Cases of Sonne Dysentery.**—*Lancet.* 1930. May 31. p. 1181. [9 refs.]

Reference is made by the author to the relationship of *Bact. dysenteriae* Sonne with *Bact. coli anaerogenes* and with the dispar group. His own account is of an outbreak of dysentery in a children's ward (Westminster Hospital) in which the Kruse-Sonne bacillus was isolated. Four cases in all occurred and the cultural and serological tests were fully positive. The outbreak was sudden in onset, but the symptoms were mild in character.

W. F. Harvey.

FRASER (A. M.) & SMITH (J.). **Endemic Bacillary Dysentery in Aberdeen.**—*Quarterly Jl. Med.* 1930. Apr. Vol. 23. No. 91. pp. 245–259. [44 refs.]

The article provides a very useful discussion of the subject of Flexner and Sonne dysenteries from a statistical, clinical, therapeutic, bacteriological and epidemiological point of view. During the years 1919 to 1928 there are recorded 147 cases of Flexner, 147 of Sonne, 28 of clinical dysentery without bacteriological evidence of cause, and no cases of Shiga dysentery. Most of the cases, both of Flexner and Sonne dysentery, occur in the age period 0 to 5 years, but this is specially so for the Sonne cases, where 108 out of 147 cases were in this age group. Percentage death rates have been 8.1, 4.08 and 6.2 for Flexner, Sonne and all types of dysentery respectively. The clinical descriptions refer to cases of Flexner and Sonne dysentery as seen in hospital practice; these cases could not be easily distinguished from each other or from mild infections due to members of the *Salmonella* group except by bacteriological investigation. They were characteristically sudden in onset, with general and alimentary symptoms. Temperature was not as a rule high, and was in 46.5 per cent. of cases mainly normal. If the temperature was raised, however, it did not as a rule last for more than 48 hours. In certain atypical Flexner cases, with rapidly produced toxæmia, central nervous symptoms manifested themselves before the truly dysenteric symptoms and some of these patients arrived in hospital with the diagnosis meningitis. Under the heading bacteriological investigation the interesting facts are noted that for 57 cases of Flexner dysentery the bacilli had disappeared in 37 by the 1st week, in 5 by the 2nd week, in 12 by the 3rd week and in the remaining 3 by the 4th week. For Sonne dysentery the corresponding figures were 41 by the 1st week, 4 by the 2nd, 4 by the 3rd, 3 by the 4th, while 1 remained continuously positive for 7 months. In Aberdeen, the Flexner organism met with has been that known as the Z type with a few sporadic cases of W, X, and Y types and none of the V type. The disease was "mainly spread by direct contact with the infectious discharges of subacute cases and convalescent carriers."

W. F. Harvey.

SMITH (J.) & FRASER (A. M.). **Agglutination Reactions in Relation to Sonne Dysentery.**—*Jl. Hygiene.* 1930. June. Vol. 30. No. 2. pp. 216–220. [15 refs.] [City Hosp., Aberdeen.]

It was found that positive agglutination increased steadily from the onset of the disease to a maximum 14 days later, with titres varying from 1 in 50 up to 1 in 6,400. A control series was afforded by 9 individuals, whose sera had been tested before they were attacked with dysentery. In all of these but one agglutination was negative for a dilution of serum of 1 in 50. After the attack the titre became positive in all of them, and in the individual who originally had given an agglutination of 1 in 50 the titre reached 1 in 400. Another series of tests, made with 138 sera of individuals in hospital, but not suffering from dysentery, gave for dilutions 1 in 50, 100, 200, 400, 800, and 1,000, positive results in 16, 6, 8, 1, 1, and 1 cases respectively, while 105 were negative. These results demonstrate that in the majority of cases an attack of Sonne dysentery gives rise to the presence of specific agglutinins. The occurrence of agglutination in 33 out of 138 individuals in

hospital for other diseases than dysentery indicates that Sonne dysentery is widespread and probably not sufficiently severe to require medical attention.

W. F. Harvey.

STANLEY (L. L.), GARFINKLE (F. E.) & GODDARD (W. P.). **Prison Epidemic of Flexner's Dysentery.**—*Jl. Amer. Med. Assoc.* 1930. Mar. 22. Vol. 94. No. 12. pp. 857-860.

In a population of 4,226 prisoners in California, 946 were attacked by a severe diarrhoea. *Bact. dysenteriae* Flexner was shown to be the causative agent. All the inmates affected fed in the general mess. Flexner's bacillus was found to be viable after eleven days when placed on bread at room temperature. The usual course of the disease was from three to four days: no deaths. It was impossible to determine which of the various treatments was most efficacious: (a) castor oil and whey; (b) castor oil, whey and bismuth; (c) castor oil and bacteriophage; or (d) bacteriophage alone. (Bacteriophage alone was given to 40 cases, and with castor oil to 40 other cases.)

H. M. H.

SICÉ (A.) & BOISSEAU (R.). Notes sur la dysenterie bacillaire en Afrique Equatoriale Française. Bacilles dysentériques. Bacilles pseudo-dysentériques. [**Bacillary Dysentery in French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 385-393 [12 refs.] [Pasteur Inst., Brazzaville.]

The authors show that bacillary dysentery is widespread and not infrequent. Clinically it presents no new features. Typical Shiga, Flexner, Hiss, Strong, strains of bacteria were isolated, and other strains which gave varied atypical cultural reactions. Shiga bacterium was isolated 34 times in 155 cases—21·9 per cent.

H. M. H.

MORIWAKI (George). **Fatal Intestinal Bleeding in Bacillary Dysentery. Report of a Case.**—*China Med. Jl.* 1930. Apr. Vol. 44. No. 4. pp. 376-378. With 1 text fig. [Government Hosp. for Infectious Diseases, Port Arthur.]

Continual intestinal haemorrhage. Death on 17th day of illness. No autopsy. Culture of mucous portion of sanguineous stool gave colonies of a bacillus identified by sugar reactions as belonging to Komagoma B. group of dysentery bacilli.

H. M. H.

DE LAVERGNE (V.), MELNOTTE (P.) & DEBENEDETTI (R.). Sur la séro-agglutination dans la dysenterie à bacille de Flexner. [**Serum Agglutination in Flexner Dysentery.**]—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1251-1252.

The test was microscopic. Forty-four sera of definite Flexner dysentery cases, examined from the 7th day, showed agglutination of the following titres: 18 at 1 in 2,000, 17 at 1 in 1,000, 1 at 1 in 500, 4 at 1 in 300 and 1 at 1 in 200, with no coagglutination to the Shiga bacillus at 1 in 50. Other sera were examined at the same time—some of patients with diarrhoea only, others of individuals without any

symptoms. All of the first of these showed some degree of agglutination. Some of the symptomless individuals did show agglutination and the remainder nothing higher than 1 in 50. Healthy persons gave no agglutination above 1 in 50.

W. F. Harvey.

DE LAVERGNE (V.), MELNOTTE (P.) & DEBENEDETTI (R.). Valeur du séro-diagnostic dans la dysenterie bacillaire. [**Value of Serum Diagnosis in Dysentery.**]*—Ann. Inst. Pasteur.* 1930. June. Vol. 44. No. 6. pp. 697-710. [15 refs.]

The disappointing results of culture of dysentery bacilli from the stools, especially if the examination is carried out at a distance, are well known. It is therefore important to know how far serum diagnosis, which is not subject to the limitation of the time elapsing before arrival at the laboratory, is specific. The authors set out to test this point in a small epidemic of established Flexner dysentery and they recognized the facts that positive serum diagnosis is not attainable before the 5th to the 7th day of the disease and possibly in some specially severe cases not attainable at all. Their material consisted of the serums of cases of : (1) patients with clinical dysentery ; (2) patients with diarrhoea which was not dysenteric in character ; (3) patients belonging to the military unit attacked without evident intestinal affection ; (4) patients who had had dysentery 4 months previously with agglutinins in the blood ; (5) patients suffering from typhoid fever ; and (6) healthy persons not belonging to the epidemic focus and who had recently received T.A.B. vaccine. The first three classes gave quite appreciably high titres of agglutination to the Flexner bacillus, many of which reached 1 in 1,000 to 2,000, without any correspondingly high titre for the Shiga bacillus. The fourth class had originally given high titres and still showed a very specific agglutination of 1 in 200. The remaining classes showed no specific agglutination. It is necessary in carrying out agglutination tests for dysentery to use well-chosen strains with highly specific agglutination characters, and to carry the dilution of the test serum out to its limiting values. If agglutination is positive to Flexner and not to Shiga there is no question that the dysentery is of Flexner type. If, however, it is positive to Shiga and at the same time positive in a somewhat higher degree to Flexner, the probability is in favour of a Shiga dysentery. The authors consider that titres of 1 in 50 for Shiga and 1 in 75 Flexner are specific. These low agglutinations are, however, not those of actual current disease, but are manifestations of disease which has occurred some months at least previously. A high titre is specifically diagnostic of dysentery.

W. F. Harvey.

GHOSH (H.). Nouvelle méthode pour l'identification du type de l'infection bacillaire dysentérique. [**New Method of Identification of Type of Dysentery Bacillus.**]*—C.R. Soc. Biol.* 1930. Jan. 18. Vol. 103. No. 2. pp. 55-57.

The author states that the only specific treatment for bacillary dysentery is serum therapy. It is known that Shiga antidysentery serum acts with vigorous specificity against Shiga-Kruse infections and is as sharply specific as diphtheria antitoxin in diphtheria. Flexner antidysentery serum has not the same exact specificity. The anti-

Shiga serum is both antitoxic and antimicrobial, while the anti-Flexner is antimicrobial only, and is always less specific than the former, probably because, while the Shiga-Kruse organisms contain a soluble toxin, the Flexner does not—or contains only very little of it. Thus, were it possible to identify rapidly the variety of dysentery bacterium present, a rapid specific effect could be obtained by the appropriate antiserum in the usually very toxic and often fatal Shiga infections. Hitherto a wait of 72 hours is imposed before result of culture of faeces can be known.

The author found that *in vitro* a mixture of autolysed filtrate of Shiga-Kruse bacterium and of its antiserum (from animal immunized with autolysed Shiga-Kruse bacterium) gave flocculation, while mixture of autolysed filtrate of Flexner bacterium, or of Salmonella group, with corresponding antiserum gave none. Following up this observation, he thought it likely that the stools of patients suffering from acute Shiga-Kruse infections would contain autolysed toxin which would give flocculation with Shiga-Kruse antidysentery serum. And this has proved to be the case.

Technique.—Use faeces obtained as soon as possible after onset of illness. To 20 cc. of faeces add 0.5 per cent. CHCl_3 ; mix well; and incubate for 30 minutes. Filter through fine muslin, then through Pasteur-Chamberland bougie L2 under light pressure. To get a filtrate quickly a little physiological saline solution may be added. Take 4 cc. of the filtrate: in each of two tubes place 1 cc. of the filtrate and 0.2 cc. of anti-Shiga serum. Add to control tube one drop of 1 in 5 commercial formaldehyde. Incubate both tubes in water bath for one hour. A positive reaction is shown by appearance of fine flocculi, distinctly seen by lens. The control is quite clear. If the serum contain precipitate it must be cleared by centrifugation.

By this technique the author has examined 22 dysentery cases—6 Shiga, 14 Flexner, 2 Gaertner. Flocculation appeared in the 6 Shiga cases; none in the 16 other cases. Flexner and Gaertner serums were tried; they produced only a slight opacity but no flocculation, even after 6 hours' incubation in a water bath. No flocculation could be obtained with the faeces of the Shiga cases four to five days after onset of illness.

H. M. H.

PACHECO (Genesio). Resultado do emprego de um methodo para diagnosticar a dysentaria bacillar em 24 horas. **Results of the Use of a Method for the Diagnosis of Bacillary Dysentery in 24 Hours.**—*Archivos de Hyg. Rio de Janeiro*, 1930. Jan. Vol. 4. No. 1. pp. 115–121. English summary. [National Dept. of Public Health, Rio de Janeiro.]

The tests applied were: motility, Gram staining, sugar fermentation, catalase test, and agglutination with a serum dilution of over 1 in 500. The method gave an exact correspondence 18 times out of 49 with stools which were positive for bacillary dysentery by the longer and usual method.

W. F. Harvey.

SCHUBERT (Johann). Der Wandernährboden. I. Seine Anwendung auf die Typhus-Dysenteriediagnose. **[A Travel Medium. Its Application to the Diagnosis of Organisms of the Typho-dysentery Group.]**—*Zent. f. Bakt.* I. Abt. Orig. 1930. Mar. 4. Vol. 116. No. 1. pp. 18–22. With 5 text figs. [5 refs.] [General Hosp., Eppendorf.]

The article describes the preparation of a transparent medium made up with nutrient agar, gelatin, glucose and water blue as indicator; it has

a semi-fluid consistence to allow those organisms possessed of motility to travel downwards into the deeper layers. The degree of motility shown by individual organisms is the diagnostic feature used in differentiation and is gauged by the depth to which change of colour, turbidity and gas formation extend.

W. F. Harvey.

SARTORIUS (Fedie). Ergebnisse der bakteriologisch serologischen Ruhrforschung. [**Bacteriological and Serological Research in Dysentery.**]—*Monatsschrift f. Kinderheilk.* 1930. Apr. Vol. 46. No. 6. pp. 481–518. [262 refs.] [Children's Clinic, Univ., Münster.]

In this comprehensive review of the subject the author deals with the most important organisms which have established a title to causation in dysentery. The article is critical and informative with abundant reference to literature. It should prove very useful to any one wishing to pick up the threads of the controversy which still continues with regard to dysentery organisms. Briefly stated the contention is that most of these organisms, which are now referred to under different names find their original description under either the toxic species Shiga-Kruse or the non-toxic "pseudo-dysentery" types A to J of Kruse. The term pseudo-dysentery should, however, be abandoned for the better one of paradysentery. In a table the author sets out what he considers to be identical organisms: Shiga-Kruse with Aoki VIII; Kruse types A, D and H with the colitis bacteria of Braun, the Flexner group of Andrews, the Aoki groups I, II and V, and the paradysentery of Castellani (probably); Kruse type E with Sonne III, *Bact. dispar* of Andrews and the metadysentery organisms of Castellani (probably); Kruse type J with the Schmitz bacillus, *Bact. ambiguum* of Andrewes and paradysentery of Stutzer.

W. F. Harvey.

PACHECO (Genesio) & RODRIGUES (Celso). Sur la classification des bacilles dysentériques. [**Classification of Bacilli of Dysentery.**]—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1324–1326. [3 refs.]

The study refers especially to the mannite fermenters. According to the authors the apparent variability of strains of this group is due to the development of latent characters during a long period of cultivation. These characters become definite and do not disappear again when they have manifested themselves after two years of laboratory subculture. The classification drawn out—into the types Shiga, Schmitz, Saigon, Y Hiss and Russell, Flexner and E-Kruse—is based on carbohydrate and serum reactions.

W. F. Harvey.

BOJLÉN (Knud). Types épidémiologiques des bacilles dysentériques au Danemark. [**Epidemiological Types of Danish Dysentery Bacilli.**]—*C.R. Soc. Biol.* 1930. Feb. 28. Vol. 103. No. 8. pp. 613–615.

Out of 732 cases of dysentery 537 were due to bacilli of Kruse E-Sonne type, 193 of Flexner type and only 2 of Shiga-Kruse type. The bacilli

of Kruse E-Sonne type can be subdivided into 4 classes according as they ferment or do not ferment xylose and maltose. The first subdivision of Flexner bacilli was into two large groups according to their action or want of action on saccharose. The further subdivision was made with reference to fermentation of sorbite and arabinose and the indole reaction.

W. F. Harvey.

BRAUN (H.) & BAAKE (Fr.). Zur Biologie des Ruhrbazillus Kruse-Sonne. [**Biology of the Kruse-Sonne Dysentery Bacillus.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. May 15. Vol. 116. No. 6/8. pp. 462-470. With 6 text figs. [10 refs.] [Municipal Hyg. Inst., Univ., Frankfurt a.M.]

Two types of colonies are formed by the Kruse-Sonne bacillus, one described as round with wavy margin and structure, the other as flat with a coarsely dentate margin. Development of bacteria capable of forming flat colonies can take place from round colony organisms but not *vice versa*. The experiments of the authors were devised to determine whether the development of "flat" bacteria from "round" bacteria could be facilitated by insufficient food material (hunger agar) or by the action of bacteriophage. Neither method could be shown to be effective. Of these two forms the bacterium of the flat colony is by far the more sensitive to the bactericidal action of sera and to the action of bacteriophage and yet in an individual suffering from Sonne dysentery agglutinins to both these forms are developed.

W. F. Harvey.

IACONO (Igino). I bacilli metadissenterici (ricerche sperimentali). [**Meta-dysentery Bacilli (Experimental Study).**]—*Il Morgagni*. 1930. Mar. 9. Vol. 72. No. 10. pp. 443-444, 447-456. [III Inst. of Clin. Med., Univ., Naples.]

This is an exposition of CASTELLANI's group of metadysentery bacilli which are differentiated from the true dysentery of Shiga and the paradyentery of Flexner and others by the fact that they ferment lactose as well as mannite and may, but slowly and not constantly, produce clotting of milk. The experimental work detailed consisted in carrying out the fermentative and serological reactions of the cultures obtained from the Ross Institute. No fresh ground is broken [see this *Bulletin*, Vol. 26 p. 155].

H. H. S.

MARTIN (C. de C.). A Note on the Keeping Properties of Polyvalent Dysentery Bacteriophage.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 945-948. [Central Research Inst., Kasauli.]

The bacteriophage was taken to England from Rangoon in November, 1927, brought back to Rangoon in December, 1928, stored in Calcutta from January to June, 1929, and sent up to Kasauli by goods train at a time when the temperatures in the plains may be 110° to 120° F. in the shade. It was tested for its bacteriolytic action, at the end of this period of 20 months, on strains of Shiga and Flexner organisms and found to have retained activity. There was no evidence in any of the capsules tested of the presence of an organism of the dysentery group.

W. F. Harvey.

SHIIBA (Y.) & MATSUOKA (K.). **Progress Report on Immunization per os against Typhoid and Dysentery.**—*Acta Med. in Keijo*. 1929. Vol. 12. No. 4. pp. 286-290. [Microbiol. Dept., Imperial Univ., Keijo.]

In the case of dysentery 24-hr. cultures were killed at 65° C. for one hour and the bacterial bodies dried. Two pills, each containing 0.003 gm. dried bacilli, were administered with water before breakfast for 5 consecutive days. Unpleasant symptoms were rare, amounting to slight diarrhoea or gastric pain in a few cases. Typhoid pills were similarly prepared, but contained 0.02 gm. dried organisms. It is still too early to draw any conclusions as to the results of administration.

W. F. Harvey.

WALKER (W.) & WATS (R. C.). **Dysentery Prophylaxis by Oral Bilivaccin at Poona and Secunderabad.**—*Jl. Roy. Army Med. Corps*. 1930. Mar. Vol. 54. No. 3. pp. 190-194. [2 refs.]

The trials made had reference to the use of "bilivaccin" by the mouth as prophylactic against bacillary dysentery and its effect upon the symptoms and course of the disease when contracted. A certain number of men in a few selected military units received the vaccine and the remainder served as controls. Instructions issued with the vaccine were carefully followed. Altogether 1,400 men received the vaccine out of a total of 5,080. The results showed no evidence of any prophylactic effect of oral bilivaccin and no modification of the disease when contracted.

W. F. Harvey.

FONFOYNONT & RAZAFINDRALAMBO. Quelques cas de dysenterie bacillaire dont un certainement à Shiga, à Tananarive. [**Bacillary Dysentery in Madagascar.**]—*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 428-429.

HERIVAUX (A.). Note sur la dysenterie bacillaire à Tananarive.—*Ibid.* pp. 429-433. [Pasteur Inst., Antananarivo.]

Again confirm the fact that bacillary dysentery is not rare in Madagascar, and that there occur infections with Shiga bacterium.

H. M. H.

MIXED AND UNCLASSED DYSENTERY.

LITTLE (C. J. H.) & BORNSHIN (W.). **The Dysenteries of Mhow, Central India and the Central Provinces.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1015-1036. [5 refs.]

An interesting and valuable paper.

(1) Over 90 per cent. were bacillary; and 90 per cent. of these were due to *Bact. dysenteriae* Flexner. Less than 10 per cent. were caused by *E. histolytica*.

(2) Over 90 per cent. of positive cultures were obtained in bacillary dysentery, if stool were plated within thirty minutes of passage. If stool were more than 3 hours old only 40 per cent. gave positive cultures.

(3) In efficiently treated cases Flexner bacillus persisted much longer in the stools than did Shiga.

(4) Careful examination (results fully tabulated in this paper) of these cases showed that *fewer errors of diagnosis would be made if cases in which the mucus was acid were treated as amoebic dysentery and all others as bacillary*—a suitable [easy and quick] test for those who have not access to microscope or laboratory.

(5) "Green diarrhoea" in children was frequently caused by Flexner.

(6) Many amoebic dysenteries were probably cases of chronic amoebiasis lit up by infection with a dysentery bacillus.

(7) In infants Charcot-Leyden crystals did not indicate amoebic dysentery.

(8) Agglutinins produced during attack of Flexner dysentery were not specific to the type of infecting organism.

(9) Flexner W appeared to be predominant type in the area, but "percentage titre" method of typing did not always give correct classification.

(10) Emulsion of different types of Flexner in saline and glycerine, given as oral vaccine in total dosage of 180 million bacteria, gave satisfactory results in a very limited trial. Both it and similar emulsion of Shiga failed to produce agglutinins in experimental rabbits.

H. M. H.

PACHECO (Genesio) & DE MENDONÇA (F. Carneiro). Um anno de investigações nas dysenterias do Rio de Janeiro. **One Year Investigations on the Dysenteries of Rio de Janeiro.**—*Archivos de Hyg.* Rio de Janeiro. 1930. Jan. Vol. 4. No. 1. pp. 5-38. [17 refs.] English summary. [National Dept. of Public Health, Rio de Janeiro.]

In this investigation of stools of suspicious cases of dysentery, 385 were from the urban zone and 250 from the rural zone. The authors employed Teague's medium and sowed one fragment of mucus over 3 different points of the same plate in succession. Two or three plates of 15 cm. diameter were used to each case. As tests they used the cellular picture, the presence of mucus in the stool, sugar fermentations and serum reactions. All four tests are required, but the presence of mucus is a particularly useful presumptive sign in bacillary dysentery. The urban cases gave a percentage of 32.7 positive. Besides dysentery bacilli, amoebae were found in 14 cases and paratyphoid bacilli in 15 cases. Rural cases, where the dysenteric character of the stools was much less evident than among the urban cases, afforded only 12 per cent. of positive results.

W. F. Harvey.

KESSEL (John F.) & MASON (Verne R.). **Protozoan Infection of the Human Bowel. A Comparison of Laboratory and Clinical Observations.**—*Jl. Amer. Med. Assoc.* 1930. Jan. 4. Vol. 94. No. 1. pp. 1-5. [11 refs.]

The authors' summary and conclusions are :—

" 1. Patients in the Los Angeles County General Hospital, 60 per cent. of whom showed colitis symptoms gave an incidence of intestinal protozoan infection similar to that in cases examined by KOROB in the California State Board of Health, and somewhat higher than that estimated by BOECK and STILES for hospitals throughout the United States.

" 2. Routine culture of stools in Ringer's egg-serum medium has not increased appreciably the percentage of *E. histolytica* infection over examinations made by the standard smear method, though both *Chilomastix* and *Trichomonas* have been noticeably increased.

TABLE V.
Frequency with which Cases are Associated with Diarrhoea, Chronic Colitis, Constipation, Gallbladder Disease and Duodenal Ulcer.

	Number of Cases.	Colitis with Diarrhoea or Dysentery.*		Chronic Colitis without Diarrhoea or Dysentery.		Diarrhoea and Colitis.†		Spastic Colitis		Constipation.		Gallbladder disease.		Duodenal Ulcer.	
		Num-ber.	Per cent.	Num-ber.	Per cent.	Num-ber.	Per cent.	Num-ber.	Per cent.	Num-ber.	Per cent.	Num-ber.	Per cent.	Num-ber.	Per cent.
Negative for protozoa (4 to 6 examinations) ...	200	28	14	25	12.5	53	26.5	15	7.5	49	24.5	3	1.5	15	7.5
Harmless protozoa, <i>E. coli</i> , <i>E. nana</i> , <i>Councilmania</i>	200	15	7.5	28	14	43	22.5	17	8.5	45	22.5	8	4	6	3
<i>E. histolytica</i> ...	100	26	26	40	40	66	66	7	7	24	24	3	1.5	4	4
<i>Giardia</i> ...	50	12	24	10	20	22	44	1	2	12	24	2	4	3	6
<i>Chilomastix</i> ...	100	10	10	21	21	31	31	7	7	29	29	13	13	8	8
<i>Trichomonas</i> ...	50	8	16	9	18	17	34	3	6	10	20	3	6	8	16

* Exclusive of bacillary dysentery.

† Percentages in this column are higher than in table IV because they take into account diarrhoeic and colitis symptoms that may be superimposed in cases presenting an otherwise adequate diagnosis.

" 3. Routine bacteriologic culture of material from proctoscopic smears and fresh stools for *B. dysenteriae* and gram-positive cocci from cases found to be positive for intestinal protozoa, has shown that these bacteria are present in a low percentage of such cases and when present may have a bearing on the history. They are insufficiently numerous in Los Angeles, however, to obscure the clinical picture of protozoiasis in a high percentage of cases. *B. dysenteriae* has been found most commonly in *Giardia* infections among children.

" 4. In a comparison of hospitals cases positive for intestinal protozoa with cases negative for intestinal protozoa the following general deductions may be drawn :

" (a) Patients harbouring *E. coli*, *E. nana* and *Councilmania lafleuri* do not exhibit gastro-intestinal symptoms more frequently than those negative for intestinal protozoa.

" (b) Patients harbouring *E. histolytica* exhibit colitis symptoms about three times as frequently as those negative for intestinal protozoa. This fact emphasizes the importance of routine examination for *E. histolytica* in patients who exhibit gastro-intestinal symptoms.

" (c) The group positive for flagellates (*Giardia*, *Chilomastix* and *Trichomonas*) is associated more frequently with gastro-intestinal symptoms than the groups negative for protozoa or positive for the commensal amoebas . . .

" (d) Twice as many children found to harbour *Giardia* exhibited gastro-intestinal symptoms as did the adults who harboured *Giardia*.

" (e) ' Spastic colitis ' and constipation are not associated more commonly with the groups harbouring any intestinal protozoa than with those negative for intestinal protozoa.

" (f) Cases showing symptoms of gallbladder disease and duodenal ulcer show an increased incidence of *Chilomastix* and *Trichomonas* infection."

H. M. H.

MAGATH (Thomas B.) & BROWN (Philip W.). **A Study of the Symptom, Diarrhea. I. The Relation to Flagellate Infestation.**—*Amer. Jl. Trop. Med.* 1930. Mar. Vol. 10. No. 2. pp. 113-136. [18 refs.] [Mayo Clinic, Rochester, Minn.]

A valuable paper giving full details of a careful study of 60 patients infested with *Chilomastix mesnili* only; of 267 infested with *Giardia lamblia*; and of 420 control subjects in whom parasites were not found after at least three stool examinations. The authors' records indicate that *Chilomastix mesnili* is more common in the South Atlantic States than in other portions of the U.S.A. *Giardia lamblia* is general throughout the United States and is more common in children than in adults.

In each of the groups of cases studied, diarrhoea, either intermittent or steady, was of practically equal occurrence: and so was constipation and incidence of normal stools. Bloody diarrhoea is, perhaps, less common with *G. lamblia* than in the control cases.

Achlorhydria, although often found correlated with diarrhoea, did not in itself explain the diarrhoea; this was most often explainable by improper food or infection with bacteria or perhaps by some as yet unknown abnormal physiological state. Most of the patients were relieved by dieting and general hygienic measures. Scientific proof was lacking that intestinal flagellates caused diarrhoea.

H. M. H.

BUROWA (L. F.). Yatren in der Therapie der Colitiden. [**Yatren in the Treatment of Colitis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Sept. Vol. 33. No. 9. pp. 467-472. [4 refs.] [Protistol. Clinic, Central Asiatic State Univ., Tashkent.]

Brief clinical accounts of illustrative cases are given. As result of his experience with 24 cases, viz.: 8 cases of amoebic dysentery; 11 of ulcerative colitis; 5 of constipation following ulcerative colitis, the author stresses the value of treatment by Yatren and emetine in combination, for which he claims 96 per cent. good results and 4 per cent. failures. [Imposing percentages and a small number of cases.]

H. M. H.

TAKEDA (T.). Sur l'échange intermédiaire anormal dans la dysenterie infantile. [**Abnormal Metabolism in Infantile Dysentery.**]—*Oriental Jl. Dis. Infants.* 1929. Nov. Vol. 6. No. 3. p. 35. [Pediat. Inst., Imperial Univ., Kyoto.]

In 79 cases of infantile dysentery the author made repeated examinations of the patients' urine. Acetonuria developed most often in the first 24 hours. It was in greatest quantity and lasted longer in the intestinal type of dysentery, than in the nerve or toxic type. Acetonuria was always most marked from the 2nd to the 5th day and then diminished, as was also the case with oxybutyric acid. These observations suggest some arrest of hepatic function due to the dysentery toxin.

H. M. H.

ZIA (Samuel H.). **Mixed Infection of Acute Dysentery and Typhoid Fever.**—*Nat. Med. Jl. China.* 1930. Feb. Vol. 16. No. 1. pp. 28-33. [8 refs.] [Union Med. College, Peking.]

The author gives a summary of 13 cases of mixed infection of acute dysentery and typhoid fever. In 10, specific organisms of dysentery were determined. The prognosis was fairly good.

H. M. H.

BANUELOS (Trinidad P.). Typhoid and Dysentery Survey for the Last Semester of 1928.—*Jl. Philippine Islands Med. Assoc.* 1929. Dec. Vol. 9. No. 12. pp. 440-442. [San Lazaro Hosp., Manila.]

DIMITRAKOFF (K.). Die Amöbenruhr in Bulgarien. Ein Fall subakuter Amöbenocclusion des Dickdarms.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Jan. Vol. 34. No. 1. pp. 54-58. With 2 text figs. [1 ref.] [Therap. Clinic, Univ., Sofia.]

ISHIKAWA (S.). Enterohemorrhage of Dysentery Patients and its Statistic Observation.—*Jl. Oriental Med.* 1930. Mar. Vol. 12. No. 3. [In Japanese. English summary p. 28.] [Manchuria Med. College, Mukden.]

MUNRO (Robert). Prophylaxis against Dysentery by Oral Vaccines. [Memoranda.]—*Brit. Med. Jl.* 1930. May 31. p. 1001.

SHEDROW (A.). Amoebic Abscess of the Liver cured by Medical Treatment.—*Jl. Med. Assoc. South Africa* 1930. May 24. Vol. 4. No. 10. pp. 290-292.

SILVERMAN (Daniel N.). Bacillary Dysentery in Louisiana.—*New Orleans Med. & Surg. Jl.* 1930. May. Vol. 82. No. 11. pp. 782-783.

ZAFRA-CUAJUNCO (Dolores). Care of Children convalescing from Dysentery.—*Jl. Philippine Islands Med. Assoc.* 1929. Nov. Vol. 9. No. 11. pp. 407-409.

SLEEPING SICKNESS.

YORKE (Warrington), ADAMS (A. R. D.) & MURGATROYD (F.).
Studies in Chemotherapy. II. The Action *in Vitro* of Normal Human Serum on the Pathogenic Trypanosomes, and its Significance.—*Ann. Trop. Med. & Parasit.* 1930. Apr. 7. Vol. 24. No. 1. pp. 115–163. [3 pages of refs.]

As a result of work published in 1929 [*ante*, p. 237] in which the authors describe their method of maintaining pathogenic trypanosomes alive *in vitro* at 37° for 24 hours, by use of serum from the rabbit and other animals, they were able to show for the first time that *in vitro* as well as *in vivo* human serum (and plasma) destroys *T. rhodesiense* and spares *T. gambiense*. This led them to the further enquiry into the meaning of these observations in the epidemiology of human trypanosomiasis, and to put forward an interesting hypothesis. Their conclusions are as follows:—

" 1. The interesting discovery made by Laveran, in 1902, that normal human serum, when injected into mice suffering from nagana, exerted a marked effect on the course of the infection, has called forth an enormous number of papers dealing with different aspects of the subject.

" 2. In the historical survey which we have given of this work, it is pointed out that when Laveran and Mesnil first discovered the fact that human serum had a definite therapeutic effect on mice infected with *T. brucei*, they were inclined to associate the phenomenon with man's immunity to this parasite. The facts, however, that Laveran and Mesnil and many others who followed them were unable to demonstrate that human serum had any action *in vitro*, and that Laveran and Mesnil had found that plasma was but slightly active as compared with serum, tended to shake confidence in the view; and Rosenthal, who has spent many years investigating the subject has reached the definite conclusion that the therapeutic and protective property of human serum is in no way related to man's immunity to the pathogenic trypanosomes of animals. Rosenthal believes that human serum contains a trypanocidogenous substance which, on injection into an animal, is converted into an active trypanocidal substance by the reticulo-endothelium of that animal.

" 3. In contrast to the experience of previous workers, we have succeeded in showing that normal human serum—and, equally, normal human citrated plasma—exerts a pronounced trypanocidal action *in vitro* at 37° C., on a number of strains of pathogenic trypanosomes. With our laboratory strains of *T. equiperdum* and *T. rhodesiense*, the trypanocidal action of normal human serum could be demonstrated even when the serum was diluted 5,000 and 25,000 times respectively; with two recently isolated strains of *T. congolense*, the trypanocidal action was obtained with serum diluted up to ten times; with 'Sherifuri K' strain—a recently isolated *rhodesiense*-like strain from a case of sleeping sickness in Northern Nigeria—the trypanocidal action was manifest with undiluted serum only; but on our old laboratory strain of *T. gambiense*, normal human serum had no appreciable trypanocidal action.

" 4. The properties of the trypanocidal substance of normal human serum were studied, and a method described for determining its titre. In the course of this work the interesting fact was established that the sera of certain normal sheep and of certain normal rabbits possessed 'anti-trypanocidal' properties, in that when they were mixed with normal human serum, they prevented the trypanocidal action of the latter. The sera of other sheep and rabbits did not possess this property.

" 5. In certain pathological conditions, e.g., amoebic abscess of the liver, and obstructive jaundice, the serum loses its trypanocidal power, and exerts no cytolytic action on the trypanosomes *in vitro*.

" 6. The unequivocal demonstration that *T. rhodesiense*, *T. equiperdum* and *T. congolense* are rapidly destroyed *in vitro* at 37° C. by normal human serum or plasma, and that *T. gambiense* is apparently unharmed by either, endows the well-known phenomenon of the therapeutic action of human serum in experimentally infected mice with an entirely new significance, and appears to us to afford the strongest grounds for believing that man's immunity to infection with the pathogenic trypanosomes of stock, and his relative susceptibility to *T. gambiense*, are bound up with this property of his serum.

" 7. Evidence is adduced that resistance to the cytolytic action of human serum is a 'fixed' character of *T. gambiense* which survives many years' passage through laboratory animals, but that the serum-resistance of *T. rhodesiense* is a 'labile' character which is relatively quickly acquired and quickly lost. How long a strain of *T. rhodesiense* remains resistant to normal human serum after its isolation from man is not yet known, but we have produced some evidence to show that it becomes to some extent serum-sensitive within a year, after passage through a series of only five laboratory animals.

" 8. We believe that these facts have an important bearing on the epidemiology of human trypanosomiasis, and assist in clarifying the difficult and still vexed questions of the identity of *T. brucei* and *T. rhodesiense*, and the antelope reservoir of the latter parasite, and of the relationship of these parasites with *T. gambiense*.

" 9. We have elaborated a hypothesis which, in our view, affords a reasonable explanation of the facts, so far accumulated, regarding the epidemiology of human trypanosomiasis in Africa. Briefly stated, the hypothesis is as follows:—*T. gambiense* is, like *T. rhodesiense*, identical with *T. brucei*, its apparent greater differences being merely due to more profound modification resulting from numerous passages through the human host. In other words, the source of both trypanosomes pathogenic to man—*T. gambiense* and *T. rhodesiense*—is *T. brucei*, of which the natural reservoir is the game. The game trypanosome is not pathogenic to normal man because of the protective trypanocidal action of his blood. Under certain conditions (pathological and dietetic) the trypanocidal substance disappears from the blood of man and he becomes susceptible to infection with the game trypanosome. If such an individual becomes infected he develops a *rhodesiense* infection. These infections are seen typically in *morsitans* regions where the chief food supply of the fly is game or stock; they are of sporadic occurrence and are unlikely to assume the form of considerable epidemics. We believe that *gambiense* infections likewise originated in this manner, but that having occurred in *palpalis* regions, where the contact between man and fly is more intimate than in *morsitans* regions, there was a correspondingly greater chance of man to man infection. Prolonged man-Glossina-man passage has produced the modifications of the parasite which have resulted in the characters of *T. gambiense*, the most striking of which is its 'fixed' resistance to the trypanocidal action of human serum. As it is only in Tropical Africa that this hypothesis can be put to the test of experimental enquiry we have, for the guidance of those working in the field, indicated the manner in which this enquiry could most profitably be conducted."

It is essential that all who are able to publish observations for or against this hypothesis should read the complete paper, but a few points are selected from the "discussion." The authors discuss the results of RAZGHA given in some detail, above, on page 244. RAZGHA cultivated trypanosomes pathogenic to man on a medium of equal parts of Ringer's solution and citrated human blood. He used three strains of *T. gambiense* and two of *rhodesiense* of various ages and obtained varying degrees of success. The authors explain his results in the

light of their own observations. Experiments of ZEISS and others are cited and the authors go on :—

“ The resistance of *T. gambiense* to the cytolytic action of human serum thus appears to be a remarkably fixed character, and it is difficult to avoid the conclusion that man's susceptibility to infection by *T. gambiense* is directly due to this fact. When, however, we turn to *T. rhodesiense*, the problem is not so simple. Here we have to deal with a parasite which within two years of its isolation from man is very susceptible to the cytolytic action of human serum. It seems to us incredible that our laboratory strain of *T. rhodesiense* which, as we have shown is killed by normal human serum, or plasma, *in vitro* at 37° C. within a few hours, even though the serum or plasma is diluted to such an extent that its concentration in the medium is only 1 : 25,000, could infect man ; and we are, therefore, compelled to conclude that it has changed radically since its isolation from man, and that *T. rhodesiense*, unlike *T. gambiense*, rapidly loses its serum-resistance when maintained in laboratory animals. In other words, the serum-resistance of *T. rhodesiense* is not a fixed or stable character, but is one which is relatively readily acquired and quickly lost.”

They discuss their “ Sherifuri K ” strain which in its serum resistance was intermediate between *T. gambiense* and *T. rhodesiense*. Though it was isolated from a native in Nigeria where all trypanosomiasis is of the *gambiense* type, sub-inoculated animals exhibited numerous posterior nuclear forms, the pathogenicity in guinea-pigs resembled that of *T. rhodesiense* strains and the authors understand that the adhesion test showed the parasite to be more closely related to the local strain of *T. brucei* than to that of *T. gambiense* ; moreover, *G. morsitans* occurs in the district and *T. brucei* in the game. These facts suggest that the “ Sherifuri K ” strain is *T. rhodesiense* [and, if this is so, incidentally extend the area of that species to West Africa].

The hypothesis is then set out in 8 paragraphs, thus :—

“ 1. *T. rhodesiense* is synonymous with *T. brucei*, and the antelope and other game of Central Africa constitute, as was claimed by Kinghorn and Yorke, the reservoir.

“ 2. Normal human beings cannot be infected with the parasite derived from game—either by blood injection or by the intermediary of Glossina—because of the remarkable trypanocidal power of human blood (plasma).

“ 3. In individuals suffering from certain diseases, and probably also in those suffering from the effects of insufficient or improper dietary, the trypanocidal power of the blood is lost, and consequently such persons can be infected by Glossina which have drawn the virus from game.

“ 4. When once the game trypanosome has established itself in an individual of this kind, it by degrees becomes serum-resistant—a process which is accelerated if, for any reason, the cause of the initial decrease or absence of trypanocidal substance is removed and the serum gradually recovers its lost power.

“ 5. After it has sojourned in the human host for some time, the trypanosome is, like *T. gambiense*, definitely serum-fast, and consequently—unlike the parasite derived directly from game—infective for man.

“ 6. The serum-fastness is possibly preserved during the passage of the parasite through Glossina ; and if so, the infection could spread from man to man through cyclically infected tsetse. If, however, this proves not to be the case, then the only obvious explanation of such localised epidemics of this form of the disease as have occurred, e.g., the Mwanza epidemic, is either that the fly transmits mechanically the serum-fast parasite from man to man, or that some local condition exists, e.g., dietary deficiency, or hookworm disease, which so affects the population as to deprive many individuals of the protection due to the trypanocidal power of the blood.

“ 7. If the parasite is passed on by tsetse to game or domestic animals instead of to man, it quickly loses its serum resistance—how quickly we do

not yet know, but the available evidence suggests that the period is between one and two years—and so again becomes incapable of infecting normal man.

"8. *T. gambiense* is, like *T. rhodesiense*, identical with *T. brucei*, its apparent greater differences being merely due to more profound modification resulting from numerous passages through the human host. In other words, the source of both trypanosomes pathogenic to man—*T. gambiense* and *T. rhodesiense*—is *T. brucei*, of which the natural reservoir is the game. The game trypanosome is not pathogenic to normal man because of the protective trypanocidal action of his blood. Under certain conditions (pathological and dietetic) the trypanocidal substance disappears from the blood of man and he becomes susceptible to infection with the game trypanosome. If such an individual becomes infected he develops a *rhodesiense* infection. These infections are seen typically in *morsitans* regions where the chief food supply of the fly is game or stock; they are of sporadic occurrence and are unlikely to assume the form of considerable epidemics. We believe that *gambiense* infections likewise originated in this manner, but that having occurred in *palpalis* regions, where the contact between man and fly is more intimate than in *morsitans* regions, there was a correspondingly greater chance of man to man infection. Prolonged man-Glossina-man passage has produced the modifications of the parasite which have resulted in the characters of *T. gambiense*, the most striking of which is its 'fixed' resistance to the trypanocidal action of human serum."

Finally, the authors put a number of questions to which answers should be obtained.

A. G. B.

MESNIL (F.). Sur l'adaptation à l'homme des trypanosomes pathogènes de mammifères. [**The Adaptation to Man of Trypanosomes Pathogenic to Mammals.**—*C.R. Acad. Sci.* 1930. July 21. Vol. 191. No. 3. pp. 120–122. [1 ref.]]

For some time the trypanosomes pathogenic to man and those pathogenic to animals were regarded as different species, but the discovery of *T. rhodesiense* and its transmission by *G. morsitans* has led the English authors gradually to another conception. Being unable to distinguish *T. rhodesiense* from *T. brucei*, they put forward the hypothesis that the parasites were the same. This view was combatted by LAVERAN on the ground of cross immunity experiments, and by the Germans, on the ground of TAUTE and FISCHER'S failure to inoculate man successfully with *T. brucei* [and one might add by many other persons of various nationalities on no grounds at all].

Mesnil, having discovered the sensitiveness of *T. rhodesiense* to human serum, expressed the view in 1914 that *T. rhodesiense* was of relatively recent adaptation to man. Reference is then made to the case of LANFRANCHI, who contracted trypanosomiasis in his laboratory. There is no doubt that he had *T. evansi* in his laboratory at the time he fell ill, but it is difficult to be certain with what he was infected, as immunological tests showed that *T. lanfranchii* had affinities both with *T. gambiense* and *T. evansi*.

Mesnil then records the instance of a laboratory assistant who was last year infected at the Pasteur Institute by a syringe containing *T. brucei*. He states that he had given only *T. brucei* to the laboratory in question. At Mesnil's request VAUCEL investigated the matter and has shown that the parasite obtained from the patient was the same as the strain labelled (in Mesnil's laboratory) *T. brucei* and was different from that labelled *T. gambiense*. [This work is, as yet, unpublished.]

Mesnil asks, How was this infection of man produced? He has always entertained the view that the power of human serum to act on pathogenic trypanosomes plays an important rôle in the refractory state of man. VAUCEL has investigated the strain in question and found that, although previously fairly sensitive to human serum [LAVERAN and MESNIL, 1901], it was very little so now. It was consequently in a condition very favourable to the infection of man. But this condition is without doubt insufficient. It is known that trypanosomes can be made resistant to cynocephalus serum without being able to infect this animal; and, moreover, at the request of the late Dr. SICARD three general paralytics were, at the beginning of 1929, inoculated with Mesnil's strain of *T. gambiense* without becoming infected [this is, as yet, unpublished]. The strain of *T. gambiense* used was that which Mesnil, in 1925, showed to be on the way to becoming sensitive to human serum; it is, however, still but little so and VAUCEL has shown that it is at least as refractory to human serum as the *T. brucei*. Mesnil thus arrives at the conclusion that other conditions are necessary for a trypanosome—of animal origin or animalized by conservation in laboratory animals—to force the human barrier. These conditions are without doubt of an individual order, and one may ask whether one of them is not dependent on the trypanocidal properties of the serum of a susceptible individual. This idea has been expressed by YORKE, ADAMS and MURGATROYD in a recent publication in order to explain the genesis of infections with *T. rhodesiense*. It explains the sporadic character of this disease in man which the Germans have not been able to transmit experimentally. Unfortunately, its verification is difficult on account of the antibodies which infected individuals speedily develop against the trypanosome. Mesnil has examined the trypanocidal power of the serum of the patient referred to against a heterologous trypanosome (*T. evansi*) and found it to be that of normal human serum. Be that as it may, it appears, however, to be demonstrated experimentally that a trypanosome of animal origin, such as *T. brucei*, can adapt itself to man, and this demonstration is itself of the greatest interest.

[The question of the action of normal human serum is fully discussed in the paper of YORKE, ADAMS and MURGATROYD summarized above. As is pointed out in this paper the therapeutic action of normal human serum in mice experimentally infected with *T. brucei* was discovered by LAVERAN in 1902. But LAVERAN and Mesnil, and those who followed them, were unable to demonstrate that human serum had any trypanocidal action *in vitro*, and furthermore, LAVERAN and Mesnil recorded that human plasma had but slight therapeutic action in infected mice. Although then Mesnil may have suspected that the insusceptibility of man was related to this property of human serum, the hypothesis could not be considered to rest on any solid foundation. In fact, ROSENTHAL and other German workers, who record that they had fully confirmed LAVERAN and Mesnil's observations on the inactivity of human serum and plasma *in vitro*, state most emphatically that this property of human serum is in no way related to man's immunity to the pathogenic trypanosomes of animals. The discovery by the reviewer and his colleagues that normal human serum and plasma exerted *in vitro* a pronounced trypanocidal action on the trypanosomes pathogenic to stock places the hypothesis on a satisfactory basis for the first time.]

W. Yorke.

CARPENTER (G. D. Hale). **Annual Report on Sleeping Sickness for 1928.**—*Uganda Protectorate Ann. Med. & San. Rep. for Year ended 31st December, 1928.* Appendix No. III. pp. 75–83. With 1 folding map. [Received 4th February, 1930.]

An account is given of new legislation governing the examination and control of persons inhabiting sleeping sickness areas. This is followed by a summary of the state of affairs in each year. It is remarked that almost all cases during the year have been treated with tryparsamide, and its less costly derivative trypanarsyl. MACLEOD reports from Aringa "The natives at first regarded treatment with suspicion and thirteen disappeared after receiving an injection. But the results obtained with tryparsamide were so dramatic that in a short time no difficulty was experienced in getting patients to attend regularly, and by November 16th 183 cases had received a full course of eight weekly injections of four grams for adult males and three for adult females. The same doses given twice weekly gave equally good results and no ill-effects were noticed." The number of injections of tryparsamide and trypanarsyl given at Gulu in 1928 was 1,580, and Dr. FREETH confirms previous experience that in advanced, as well as in early cases, apparent cure can be obtained by less than eight injections, so far as can be judged from signs, symptoms and examinations of the cerebro-spinal fluid. In some cases the trypanosome appears to be completely resistant to tryparsamide. Details are given of one such case—a boy aged 13—who received 48 injections (80 gm.) of tryparsamide between May, 1927, and August, 1928, and finally had to be treated with antimony and died.

Writing on the general outlook, Carpenter states that the combating of sleeping sickness presents an ever-increasing difficulty. Affairs are most disquieting in the Northern Province. The Eastern Province, except in the neighbourhood of Mjanji, appears to be free from the disease, and in the Western Province the disease is under control. The continual improvement of communications and increasing demands for labour, owing to commercial development of the country, lead to widespread movements and the intrusion of infected persons into clean areas. New outbreaks can in two instances (Murchison Bay and Aringa) definitely be attributed to this, and others are to be expected in the future.

W. Y.

MACLEAN (G.). **A Report on Human Trypanosomiasis in Tanganyika Territory for the Year ending 31st December, 1928.**—*Tanganyika Territory Ann. Med. & San. Rep. for Year ending 31st December, 1928.* IX. Scientific. pp. 170–191. [Received 21st March, 1930.]

In the previous year's report reference was made to an outbreak of sleeping sickness in Northern Tabora and the possible danger of spread to Kahama, Kibondo and Biharamulo was discussed. It was subsequently found that at that time the disease was actually spreading in the central part of the Kahama District. During 1928, sleeping sickness continued almost unabated, both in Northern Tabora and Kahama. Apart from an unimportant outbreak in Gongwe, a small scattered chieftdom in Ufipa, the position in the other areas is satisfactory. In 1928, 1,751 new cases of the disease were discovered and there were 395 deaths.

An account is given of the system of control at present in force in the Tanganyika Territory. This consists briefly in (1) the treatment of all cases, (2) the abolition of bush family villages and the aggregation of people into large settlements where land is suitable for development, (3) the prohibition of labour recruiting in the affected areas, and (4) the control of the movements of natives from one area to another.

The research being carried on at present is confined almost entirely to observations on epidemiology and treatment.

Epidemiology. It has not yet been possible to make a complete study of any outbreak in the Territory, but sufficient information has been accumulated to make the salient feature of epidemics clear. There is a close association between man and fly in bush villages. The people are bitten on their hunting and fishing expeditions, when they collect honey and wax, when they hoe their gardens, fetch their water or collect their firewood, and very frequently inside their houses. The majority have, however, lived for years without contracting sleeping sickness. While conditions have been fairly stable over short periods of time, there has been a slow but important change in the last fifty years; chiefly owing to re-distribution of population, there has been a gradual intensifying of the contact between man and tsetse. Probably before this contact was so intense there may have been sporadic cases of unrecognized *T. brucei* infection in man for an indefinite period. Finally, during the period of increased infestation a stage was reached when association between man and fly was sufficiently close and continuous for man-fly-man infection to take place. This condition having been established, all that would be necessary would be a fortuitous occurrence of a sufficient number of cases in a sufficiently small compass of time and space to start an epidemic; and having once started, there is no apparent reason why an epidemic should not spread as if the virus concerned were a true human parasite. Observations are cited in support of this hypothesis.

Treatment. Late cases treated with varying doses of Bayer 205 have invariably died, but in early cases apparent recovery is the rule. Generally speaking, tryparsamide given by itself was not found to be satisfactory. It is difficult to assess the value of combined treatment of Bayer 205 and tryparsamide because most patients find the treatment too prolonged and irksome to take a complete and regular course; nevertheless, it is the only form of treatment that has caused apparent recovery in late cases. A series of five patients was treated with stibamine glucoside, but none of them did well. Details are given of the situation in the various infected districts.

W. Y.

GILL (C. W. Hope). **A Comparative Study of Human Trypanosomiasis in Kano and in the Plateau Provinces (Northern Provinces of Nigeria).**—*West African Med. Jl.* Lagos. 1930. Jan. Vol. 3. No. 3. pp. 53-57. [1 ref.]

Two series, each of 52 cases of sleeping sickness, were examined as fully as was possible in the field. Diagnosis was made by discovery of the trypanosomes in the gland juice, series A was drawn from the flat Birnin Kudu and Gwaram districts of the south-east corner of Kano Province, and series B from the pagan village of Tof in the hilly Kaleri district of Pankshin division of Plateau Province. In the

former area, the only tsetse found was *G. tachinoides* and in the latter *G. palpalis*. As a control, 52 apparently healthy pagans drawn from a Kaleri village were subjected to a similar examination; the general conditions were similar to those at Tof, but sleeping sickness was absent. In series A, there were 42 males and 10 females; in series B, 36 males and 16 females, and in the control series, 36 males and 16 females. As regards age, 37 were under 16 years and 25 over 16 years in series A, and in series B and the control series, 4 were under 16 years and 48 over 16 years. The author explains the low incidence in children in series B by the fact that the majority of infections were probably contracted at the foot of the escarpment, 2,000 feet below, where children rarely ventured. In series A the duration of the illness varied from 10 days to 5 years, average 12·6 months, and in series B from 2 days to 3 years, average 7 months. The chief complaints in the two series are summarized in the Table.

The stage of the disease was diagnosed on clinical grounds, lumbar puncture not being a routine procedure: in series A, 21 were in an early stage of the disease and 31 in a late stage: in series B, 45 were in an early stage and 7 in a late stage.

Among the Kano Hausas, the occupations included farming, carrying water, fishing, hunting, cotton weaving and mat-making. The Tof pagans were all engaged in farming, but they frequently indulged in community beer-drinking and singing, and were accustomed to exchange visits with the villagers in the sleeping sickness country at the foot of the escarpment, some 2,000 feet below, where tsetse is prevalent. This was probably a prolific source of infection.

Data are also given regarding the condition of the cervical glands, pulse, temperature, blood pressure, general condition, somnolence, oedema, spleen, liver, heart, lungs, eyes, and nose. The auto-agglutination test was carried out in all three series. It was given by a number of apparently normal controls, but was usually more pronounced in the sleeping sickness cases; 90 per cent. of the sleeping sickness cases gave a positive formol-gel reaction, whilst only 2·5 per cent. of the controls did so.

The author concludes from his study that trypanosomiasis among the Tof pagans is of a distinctly milder character than among the Kano Hausas. He considers that the disease in the Tof pagans is similar in mildness and character to that described by MACFIE (1914) in the Eket district, of the Southern Provinces of Nigeria.

W. Y.

JOHNSON (W. B.) & LLOYD (Llewellyn). **Report of Tsetse Investigation, 1928.**—*Nigeria Ann. Med. & San. Rep. for Year 1928*. Appendix B. pp. 47–64. With 4 figs. on 2 plates & 4 folding maps.

The experimental clearing of Sherifuri in which the main foci of *G. morsitans* and *G. tachinoides* are being eliminated over a wide area has been continued. The clearing now extends for 9½ miles along the Katagum river, and for 8 miles along the Kiyawa river. The distance between the ends of the lines of clearing to the east is 3 miles, and to the west is 8½ miles, the area being approximately 100 square miles. There are no known primary foci of tsetse to the north or south of this area for a long distance. In four maps the original state of affairs and the amount of clearing done in three successive seasons is shown; and in a table the density is given of the flies in the succeeding years at certain

fixed points at two periods of the year, viz., April to June, when only primary foci are heavily infested, and September to November when secondary foci have their heaviest infestation; the density is represented by the average number of flies caught per net per hour. Other details regarding the clearing experiments in the Sherifuri and Gombe division are given.

Experience has shown that deferred grass burning in Northern Nigeria does little to reduce established thicket, although it is undoubtedly a benefit in checking its extension. Late grass burning is also of great value in checking new growth in cleared areas. An experiment was undertaken in which it was attempted to burn out established thicket by stacking grass round its edge and firing it in the late dry season as recommended by SWYNNERTON in Tanganyika. The fire was fierce, but failed to penetrate the thicket to any considerable depth. At the time of burning the density of *G. tachinoides* was 38 flies per net-hour; the day after the fire it was 14, and 6 days later 12 flies per net-hour. The day before the fire 154 of the flies were caught and released again after marking them with a spot of paint on the thorax. The day after the fire 13 (8.4 per cent.) of these were recaptured in the pool, and in all, 24 per cent. of those marked were recaptured in the following six weeks. From work of this sort, it appeared that the fire had destroyed about one-half of the tsetse infesting the pool. In the following wet season the focus was thoroughly repopulated, the density in October being 53 flies per net-hour.

The next portion of the report deals with the practical application of the adhesion phenomenon, and this is followed by an account of the experiments undertaken with the object of ascertaining the number of trypanosomes injected by infected tsetse flies. All this work has been published elsewhere and noticed in this *Bulletin*.

The last portion of the report deals with the work of the Sleeping Sickness Officers. Apparently a number of centres of sleeping sickness have been discovered in the Northern Province, and there is no doubt that during the last few years the disease has been spreading and increasing to an alarming extent. A great and almost unbroken zone is found around Kano; this area yielded 912 cases. In addition, 47 cases were found in the Hadeija division and 88 cases in the Katsina division. In the Katagum division 472 cases were found and treated at Sherifuri. In the western part of the Plateau Province many cases were found, viz., 445 at Mama, 320 at Womba, 21 at Jemaa-Kagoro and 707 cases near Kwakwi. In all, 3,012 cases have been treated and most of them have received an adequate course of tryparsamide.

A special effort has been made by two of the Medical Officers to trace as many of the sleeping sickness cases treated at Sherifuri as possible. The patients were all treated by intravenous injection, the early ones mainly with Bayer 205 and the later ones mainly with tryparsamide. When neither of these drugs was available tartar emetic was used. The heavy mortality (65 per cent. of those traced) was partly due to an epidemic of relapsing fever which occurred in 1924-25 and caused a high death rate with some desertion of villages. Of the 975 cases treated at Sherifuri 453 have not been traced. The results obtained by the use of the drugs and their combinations are shown in a series of tables. The full course of tryparsamide was 13 gm. and that of germanin 5 gm. Cases which have relapsed or have not made satisfactory progress after one course were given another course of treatment.

W. Y.

GORDON (R. M.) & AIDIN (R.). **Report on Trypanosomiasis in the Cape Peninsula, together with an Account of the Prevalence of Infected and Uninfected Tsetse-Flies in the same Area.**—*Sierra Leone Ann. Med. & San. Rep.* 1928. pp. 77–84. With 4 plates (1 map). [6 refs.]

— & DAVEY (T. H.). **An Account of Trypanosomiasis at the Cape Lighthouse Peninsula, Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 289–318. With 1 graph & 1 map in text & 6 figs. on 3 plates. [9 refs.] [Sir Alfred Lewis Jones Research Lab., Freetown.]

In the early part of 1928 trypanosomes were found in the blood or gland juice of two patients in the village of Aberdeen, Sierra Leone. In view of this discovery and of the fact that attention had been drawn to the high proportion of the children attending school at Aberdeen with enlarged cervical glands, the desirability of a thorough medical examination of the inhabitants of Aberdeen and their domestic animals was suggested. In all, 169 persons of five years of age and upwards out of a total population of 590 presented themselves. Apart from the two individuals mentioned, no cases of sleeping sickness were discovered. The authors state that if it had been possible to examine a large number of natives probably more cases would have been detected, and that certain cases recorded by them as highly suspicious were probably trypanosomiasis in which partial immunity had developed and the trypanosomes had become too scanty for detection by ordinary methods of examination.

Seventy animals (43 sheep and 27 goats) were examined by means of a single fresh blood film, but no trypanosomes were found. Dogs were very common in the village of Aberdeen, but it was considered impracticable to examine them. With the exception of monkeys and squirrels, very few wild animals were observed. A number of antelope exist in the uncleared portions of the peninsula.

General observations regarding the destruction of tsetse were made in June, July and August. The fly was found to be fairly numerous all over the peninsula; they were never observed following the ferry-boat from the mainland to Aberdeen, but were often found to accompany the boat on its return journey. Of 209 flies dissected, 40 were found to be infected. This percentage (19·1) of infected flies is very much greater than that found by BLACKLOCK in 1922 (5·9) and YORKE and BLACKLOCK in 1905 (4·7) and calls for explanation. The authors state that there must be some large reservoir of vertebrate hosts from which the flies are obtaining infection, but they add "that up to the present they have completely failed to discover the nature of these hosts." Infections were mostly limited to the proboscis, but in a few gut infections were also found. In no case was a salivary gland infection discovered.

The following recommendations are made :—

" 1. The clearing on the Peninsula is undoubtedly proving successful and should be continued. We consider that the best results would be obtained by abandoning work on isolated areas and instead concentrating all available labour in a combined effort to continue the complete clearing from the Lighthouse towards the mainland. At present this clearing extends as far as the isthmus at Man-of-War Bay and only represents a total area of about half a square mile. When a sufficiently large area has been cleared further observations could be made as to the number of flies occurring, and from these results it should be possible to reach a conclusion,

unobtainable from the present small area, as to the possibility of completely eradicating the tsetse fly from the district.

"2. A larger proportion of the inhabitants of Aberdeen should be medically examined for the presence of trypanosomes. Suspicious cases in addition to those we have already recorded, should be kept under observation and re-examined at intervals.

"3. An attempt should be made to ascertain whether fly are, or are not, breeding on the completely cleared area.

"4. The failure to discover the host responsible for the high proportion of infected fly suggests the advisability of an examination of the wild animals (deer, etc.) occurring in the Peninsula and of a further examination of the domestic stock at Aberdeen."

W. Y.

BOYÉ. La maladie du sommeil en Afrique Occidentale Française, au Sénégal, dans la Haute-Volta et au Dahomey. [**Sleeping Sickness in French West Africa, Senegal, Upper Volta and Dahomey.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Apr. Vol. 22. No. 4. pp. 749-753.

The author briefly summarizes the position of knowledge regarding sleeping sickness in the French West African Colonies. In Senegal there is a little endemic focus at Sangalcam some miles from Rufisque; in the neighbouring forests *Glossina palpalis* is found. A search made in 1928 revealed 8 infected persons. It is very probable that there also exist in the West African Colonies other small foci. A case was found at Dakar during 1928 in a native from the French Guinea. In the Sudan 4 cases were discovered in 1927, but the reports from Mauritania, the Niger and the Ivory Coast do not mention the disease.

In Haute-Volta and in Dahomey cases are more numerous. During the past few years small foci have been found on the banks of the Volta-Noire and a large focus at Sakoinsé. The most recent investigations have shown that sleeping sickness occurs endemically in a certain number of districts in the south and centre of the Colony, but does not extend beyond 13° N. Details are given regarding what has been found in the various portions of the Colony.

In 1926 and 1927 a focus of the disease was found at Togo; 25,694 persons were examined and 1,325 cases of the disease discovered. In 1928 a prophylactic sector was organized at Djougou in Dahomey, the population of which was 69,000 in a territory of 12,275 sq. kilometres. From September, 1928, to January, 1929, 27,795 persons were examined, and of these 1,198 were found to be infected and 1,141 were classified as suspects. The Tchelenga region was the most heavily infected, 18.7 per cent. of the population having the disease; in the canton of Sorouba 15.08 per cent. were infected, but in other cantons the incidence was slight and some were entirely free from the disease.

W. Y.

MURAZ (G.). Réorganisation du service de la maladie du sommeil en Afrique Equatoriale Française. [**Reorganization of the Sleeping Sickness Service in French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 331-341. With 1 folding map. [1 ref.]

The first portion of this paper gives a brief account of the development of the sleeping sickness service in French Equatorial Africa since the war. In 1918 work was undertaken in one sector only; in 1922 there

were 10 sectors and in 1929 no less than 28 sectors in which anti-sleeping sickness work was being undertaken. In 1922 all 10 sectors were supervised by medical men, but in the following year, owing to shortage of doctors, only 3 of the sectors functioned normally. This regrettable situation has been gradually improved. Owing to this defective organization, it is not surprising that in French Equatorial Africa only 30,000 cases of sleeping sickness are recorded, whereas in the Cameroons, in infected areas of only a ninth the size, 130,000 cases are recorded. The author does not believe that the morbidity in the Cameroons is any higher than it really is in French Equatorial Africa. A table shows the extent of the infected areas in the two countries and the medical service available in each. In the latter respect French Equatorial Africa compares very unfavourably with the much smaller Cameroons.

The article concludes with a statement of the personnel and organization required and of the standard treatment which, in the author's opinion, should be administered to patients in the various stages of the disease.

W. Y.

LEDENTU (G.). A propos de la lutte contre la maladie du sommeil. [**Anti-Sleeping-Sickness Measures.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 779-785.

This article is called forth by that of JAMOT on sleeping sickness in Cameroon (*ante*, p. 222). The author quotes JAMOT's statement that there is no known drug that can rival atoxyl for causing temporary abatement of a focus of sleeping sickness. He agrees with JAMOT regarding the value of atoxyl for sterilizing the peripheral circulation. JAMOT himself remarks that for this purpose atoxyl is superior to tryparsamide.

Ledentu differs from JAMOT regarding the importance of lumbar puncture as an aid to diagnosis and as a means of controlling treatment. In Ledentu's view this is a procedure of the greatest importance. He does not agree with JAMOT that it is contraindicated in the first stage. There does not appear to him to be any real danger of infecting the spinal fluid and he points out that this fear does not prevent its being done in syphilis.

W. Y.

BOURGUIGNON (G. C.). De l'importance actuelle de la ponction lombaire dans le dépistage et le traitement de la maladie du sommeil. [**Importance of Lumbar Puncture in Detection and Treatment of S.S.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 90-99.

This article, which is called forth by that of JAMOT [*ante*, p. 222], stresses the importance of lumbar puncture in the diagnosis of sleeping sickness and as a means of control of treatment. The author does not produce any new facts in support of his contentions, but illustrates his arguments from the data supplied in papers previously published.

W. Y.

CORSON (J. F.). **Observations on the Infectivity of *Trypanosoma rhodesiense* in a Relapsed Case of Sleeping Sickness during Treatment with Tryparsamide.**—*Jl. Trop. Med. & Hyg.* 1930. July 1. Vol. 33. No. 13. pp. 187-188. [5 refs.]

The work of medical officers in Tanganyika has shown that tryparsamide has much less effect on *T. rhodesiense* in man than on *T. gam-*

biense. A relapsed case of Rhodesian sleeping sickness having come under the author's observation, he decided to try giving tryparsamide chiefly when trypanosomes appeared in the blood, having in mind the possibility of a vaccinating effect and also the idea that the trypanosomes might be derived partly from those that resisted the last dose of tryparsamide as well as from the central nervous system. Reference is made to BROWNING and GULBRANSEN's observation that the administration of the same dose of a styrylquinoline compound at each relapse cured mice infected with *T. brucei* [this *Bulletin*, Vol. 25, p. 343], and to that of KLIGLER and WEITZMAN, who found that the injection of trypanosomes with Bayer 205 produced an increased resistance to infection in laboratory animals, greater than could be attributed to the action of the drug alone. [*loc. cit.*, Vol. 24, p. 573].

In the present case the opportunity was taken to test the action of tryparsamide on the infectivity of the trypanosomes by inoculating white rats with the patient's blood when trypanosomes appeared in it.

Details of the case are given: a series of rats, inoculated at different times when trypanosomes reappeared in the blood after administration of tryparsamide, all became infected, as did also a pair of rats inoculated before tryparsamide was given. The infection in one of these two rats resisted a subcutaneous injection of 0.6 cc. of a 2 per cent. solution of tryparsamide.

The following are the comments and conclusions:—

"(1) Although in our present ignorance of differences of susceptibility of different persons to trypanosome infection, figures of incidence in a population cannot properly be applied to the question of reinfection or relapse, the history of this patient and the present low incidence of sleeping sickness in this district warrant the opinion that it is a case of relapse.

"(2) The continued infectivity of the trypanosomes supports the view, based on clinical observations, that tryparsamide, in doses that can be given without much risk of causing permanent blindness, has little curative value in the later period of Rhodesian sleeping sickness.

"(3) As many of the patients who are discharged from hospitals have relapses, the question of periodical infectivity to tsetse flies of the blood of relapsed patients who are not severely ill is probably of some practical importance.

"(4) Although it seems reasonable to suppose that, under natural conditions, infectivity, as shown by the direct inoculation of susceptible animals, will usually be in accord with infectivity to tsetse flies, and may be related to virulence, it is desirable that parallel experiments should be made to estimate the amount of agreement, as the former method is so much simpler and quicker than the latter."

W. Y.

BARLOVATZ (A.). La trypanosomiase arsénorésistante est-elle transmissible d'homme à homme? [**Possible Transmission of Arsenic Resistant Trypanosomiasis.**—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 499-505.]

In the introduction to this paper the author discusses the very great difficulties in the way of obtaining an absolute answer to the important question whether arsenic-resistance is transferred from man to man by *Glossina*. He then passes to a consideration of certain observations made by him in Mayumbe, which, although they do not furnish definite proof, yet suggest strongly that arsenic-resistance is transmitted from man to man.

In 1929, a patient infected with trypanosomes, resistant to tryparsamide, visited the village of Kiniati and remained there without treatment for more than two months. At the end of the year 2 or 3 new cases of the disease were discovered in this village which were more than usually resistant to tryparsamide, although to different degrees. Kiniati lies in a district containing 20,000 persons who are but slightly affected with sleeping sickness and amongst whom no case of arsenic-resistance was discovered during 1928-1929. Furthermore, other recent cases occurring in other villages of the district were all sterilized by 2 gm. of tryparsamide.

The facts relating to the infected persons in the village of Kiniati are given in great detail, and the author subsequently passes to an analysis of them and of the objections which can be raised to the hypothesis that in the cases quoted the arsenic-resistant character of the trypanosomes was actually passed from one individual to another through the intermediary of *Glossina*. [The paper is an interesting one and should be consulted in the original.]

W. Y.

CURSON (H. H.). **Nagana in Zululand.**—*13th & 14th Reports of the Director of Vet. Education & Research.* 1928. Oct. pp. 309-412. With 8 diagrams, 3 folding maps, 36 figs. on 18 plates & 2 coloured plates.

This lengthy report is mainly of veterinary interest, but one observation of medical importance was made. This was an experiment devised with the object of confirming TAUTE and HUBER'S (1919) observation that *T. brucei* is not pathogenic for man. The author states that no record exists of any human being having contracted sleeping sickness in Zululand, and in spite of BRUCE'S (1915) statement that "many cases of death occurred among hunters and explorers, which were usually put down to malaria, but it is possible some of these may have been due to infection by nagana," it is safe to assert that the disease does not occur in the country. Thousands of persons, especially natives, are bitten by *Glossina* annually without untoward results. In order, however, to obtain experimental proof in support of this information, a small experiment was undertaken.

A European and two natives were inoculated subcutaneously with the citrated blood from a horse infected with *T. brucei*. At the same time a considerable number of animals, ranging from white mice to bovines, were inoculated at the same time and became infected. The results of these animal inoculations are shown in a table. The human beings did not become infected and animals subinoculated from them remained negative.

W. Y.

BABLET (J.). A propos de deux auto-observations de trypanosomiase africaine. [**Two Self-observed Cases of African Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 949-962. With 1 chart in text. [25 refs.]

The author remarks that although a considerable number of the French Colonial Medical Officers have become infected with trypanosomiasis only one of them, KÉRANDEL (1910), has published an account

of his case. He thinks that it will not be without interest to record his own case. The special interest of the record lies in a detailed account of the early symptoms and in the results of treatment. It resembled that of KÉRANDEL in the following respects :—

1. The appearance of the disease after a tour of a month in a heavily infected country, thus giving an incubation period of less than four weeks.
2. A pseudo-furuncle, indicating without doubt the site of infection, appeared shortly before the fever, and rapidly subsided leaving a scar.
3. The character and duration of the initial fever was very similar in the two cases.
4. Dysenteric diarrhoea lasted about a month.
5. Intermittent fever, headache, insomnia, tachycardia, and loss of weight, followed the initial febrile disturbance during the period before treatment.
6. A circinate papular erythema (trypanide) appeared $2\frac{1}{2}$ months after the commencement of the disease.
7. Autoagglutination of the red cells was observed during the same period.

The two cases differed markedly in so far as infection of the blood and gland juice was concerned. In the present case there was marked and persistent infection of the glands, whilst in KÉRANDEL the glands were scarcely involved ; in the latter there was an early and persistent septicaemia which was resistant to all arsenicals, but in the present case the blood infection was light.

The author then passes to an interesting résumé of the clinical characters of the disease in the European cases which have been recorded in France during the last twenty years ; and this is followed by certain therapeutic considerations.

Finally, as a result of study of these two cases and of about 100 published cases the author reaches the following general conclusions :—

1. There is great variation in the time at which the symptoms of the disease manifest themselves : the incubation period varies from a few days to 3 or 4 weeks, and the terminal phase may appear within a few months or may be delayed for many years.

2. The invasion by the parasites of the blood, gland juice, or cerebrospinal fluid does not appear to follow any definite rule.

3. The most constant clinical signs during the first three months are : initial fever of a remittent type succeeded by attacks at shorter or longer intervals of headache, insomnia, tachycardia ; autoagglutination of the red cells, asthenia, polyadenitis, circinate papular erythema of the thorax and limbs, and deep hyperaesthesia (Kérandel's sign). The initial pseudo-furuncle appears to be connected with the bite of an infected Glossina.

4. Search for the trypanosomes ought to be made simultaneously in the centrifuged blood, in the various lymphatic glands, and in the cerebrospinal fluid. Small doses of atoxyl sometimes provoke the appearance of parasites in the blood.

5. From the point of view of therapy, the combination of atoxyl and emetic, or of salvarsan with these, appears to sterilize rapidly recent cases and to exert a favourable influence in older cases.

6. A " security treatment " with atoxyl is necessary. The formula of MARTIN and DARRÉ—0.5 gm. of atoxyl every 5 days—gives excellent results and should be continued for at least 6 months. During the whole of this period it is necessary to watch the patient with great care.

W. Y.

SICÉ (A.). Contribution à l'étude de l'évolution de la trypanosomiase humaine. Renseignements fournis par la rachicentèse. [**Development of Human Trypanosomiasis: Information furnished by Lumbar Puncture.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 962-970. [6 refs.] [Pasteur Inst., Brazzaville.]

A number of Europeans, who were found to be suffering from sleeping sickness after seven months sojourn in French Equatorial Africa, were willing to allow of lumbar puncture, and thus it was possible to ascertain the length of time which elapsed between the date of probable infection and the first manifestations of cerebrospinal involvement. The cerebrospinal fluid of normal Europeans contains at most 1 or 2 cells per cmm. and the amount of albumin does not exceed 20 cgm. per 1,000. Details are given regarding four such cases. To these observations are added a number of others made on treated native cases; in all these the blood or gland juice was infected and the cerebrospinal fluid absolutely normal before treatment. They did not suffer from any blood relapse, but the evolution of the disease was followed by watching the changes in the spinal fluid. Ten such cases are described in detail.

Study of the European cases shows the brevity of the first stage of the disease and the precocity of the first meningeal reaction. Certain of the treated native cases showed a normal spinal fluid until the second year and then a pronounced cellular reaction with hyper-albumen content; the trypanosome was not found: it would only appear later when the meningeal membrane had lost its integrity.

Sicé refers to the literature from which it appears that certain authors on clinical grounds had suspected the early involvement of the central nervous system. As a matter of fact, spinal puncture indicates that the first period is short; the virus quickly attacks the meninges and later the nervous tissue. Human trypanosomiasis is a disease of the cerebrospinal system.

Two conclusions appear to arise from this work:—

1. The necessity for early recognition of the infection.
2. A very careful supervision during the second year following the initial diagnosis of the first stage (infection of the blood and gland juice, absolute integrity of the spinal fluid). From the 15th month it is necessary to perform lumbar punctures each 6 months for at least 18 months.

W. Y.

SICÉ (A.). Cinq ans et demi de pratique de la ponction lombaire, appliquée à la trypanosomiase humaine. [**Five and a Half Years of Lumbar Puncture in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 23-28. [4 refs.] [Pasteur Inst., Brazzaville.]

In view of the general recognition that lumbar puncture is an important procedure in the diagnosis and treatment of sleeping sickness, the author considered that it would be useful to summarize his experience of this operation during the period January 1st, 1924, to June 30th, 1929. Lumbar puncture has by degrees become a regular practice before treatment, during treatment, at the end of treatment and again some time later. He has reached the conclusion that it

can be performed without apprehension. [See also BLANCHARD and LAIGRET: this *Bulletin*, Vol. 21, p. 924.]

During the period in question 1,460 patients suffering from sleeping sickness came under observation for the first time at Brazzaville. Details regarding the condition of the spinal fluid and blood and lymph juice are given in a table.

It is noted of these 1,460 patients that spinal puncture was not performed in 110 (7.5 per cent.); these exceptions occurred mainly at the beginning of the period when the organization was not so complete as it became later; they also include some Europeans who refused puncture. Now, however, all alike are completely examined and some of the 110 were examined later.

In 190 patients (13.01 per cent.) the diagnosis of nervous trypanosomiasis was due to lumbar puncture. In 489 (35.5 per cent. [?33]) the disease was shown to be in the first stage, the spinal fluid being normal; and annual examination has shown that in 189 of these (38.65 per cent.) the disease has not advanced, notwithstanding the fact that some of them have suffered from blood relapses for which they were treated; in thirty, however, the disease was found by spinal puncture to have advanced.

The author considers the question whether direct infection of the spinal canal by lumbar puncture had anything to do with the evolution of the disease in these cases. He considers this unlikely because in none of them was the evolution discovered in less than a period of 15 months, and for other reasons which he discusses.

In all, 882 patients showed involvement of the central nervous system; in default of definite nervous symptoms most of them were recognized as such by lumbar puncture: 224 (25.4 per cent.) of these were cured in that after 2½ years the disease had not advanced and the spinal fluid had become normal, although, unfortunately, many of the symptoms due to damage of the nervous system remained; 359 (40.7 per cent.) were improved, the spinal fluid, although it had not become normal, having progressed in that direction.

W. Y.

SICÉ (A.). La rachicentèse dans la trypanosomiase humaine. Ses indications, sa valeur. [**Lumbar Puncture in Human Trypanosomiasis. Indications and Value.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8, Feb. 12 & Mar. 12. Vol. 23. Nos. 1, 2 & 3. pp. 77-90; 222-243; 307-331. With 75 text figs. [9 refs.] [Pasteur Inst., Brazzaville.]

Although lumbar puncture was occasionally employed, the usual means of diagnosing trypanosomiasis was, prior to 1922, blood and gland juice examination. In 1922, LEFROU and OUZILLEAU published a study of the examination of 240 spinal fluids and established the importance of the cytological and chemical investigation of this fluid. Their work was continued by LEDENTU and VAUCEL; and in the present paper the author proposes to deal with observations made on the oldest cases which have been kept under regular observation and to consider what conclusions can be drawn. Sicé has practically limited his observations to the cellular content, the albumin content and to the flocculation test. He has designedly omitted reference to the presence or absence of trypanosomes in the spinal fluid because

this does not appear to obey any rule ; nevertheless, this question is of importance when in the course of long treatment the parasites are discovered in centrifugation of the spinal fluid since their appearance signifies the beginning of the end.

A description is given of the author's technique in making a lumbar puncture. The patient is seated ; a needle 6 to 7 cm. in length is used, which should not be too fine as the lumbar tissues in the native are sometimes very tough. The operation should be performed gently and the puncture made immediately below the fourth lumbar spine. The fluid, which is always like spring water, is collected drop by drop until about 5 cc. is obtained. Practically no disturbance is caused by the puncture, except that in very advanced cases there may be pain, but the great majority of patients are not disturbed by it.

Cellular reaction. LEFROU and OUZILLEAU considered that above 20 cells indicates a pathological meningeal reaction. This, in Sicé's view, is incontestable ; in fact, he believes, as a result of the frequency of less than 10 cells found in natives exhibiting no nervous lesions, that it would be safe to make a diagnosis of meningeal reaction on fewer than 20 cells. The matter is, however, not of great importance, as the number of cells is not always a true criterion of the gravity of the lesions. Often a figure of 1,000 cells with an increased amount of albumin is, from the prognostic point of view, less alarming than a count of 50 cells with 0.40 or 0.50 of albumin. LEFROU and OUZILLEAU have described the types of cells found. Sicé points out that although the lymphocytes always constitute the great majority of the cells present, medium sized mononuclears are sometimes found in small numbers even from the beginning. In the more advanced cases dead cells are found intermingled with the living ones, and in particular leucocytes with segmented nucleus, plasmocytes, and also the cells described as " mulberry cells."

Quantity of albumin. This is examined in the spinal albuminometer of Sicard and Cantaloube, using trichloroacetic acid as the reagent. If there is a considerable cellular reaction the cells should first be be precipitated by centrifugation.

Flocculation. The application of the colloidal benzoin test of Quillain, Larouche and Léchelle furnishes useful information. LE-DENTU and VAUCÉL have reported fully on this reaction in sleeping sickness [see this *Bulletin*, Vol. 25, p. 335] and have shown how, under the influence of treatment, the reaction disappears first from the paralytic zone and then from the syphilitic zone *pari passu* with the improvement in the other reactions.

The cellular reaction, the hyperalbuminosis, the presence of trypanosomes and flocculation are all indicative of anatomical lesions in the meninges and central nervous system ; and the spinal fluid should be regarded as a mirror which reflects faithfully all the successive injuries done to the nervous system by the flagellates. An analysis of 10,000 spinal punctures made at Brazzaville during more than four years has enabled Sicé to describe the sequence of events.

The earliest reaction resulting from meningeal lesion is the cellular reaction. It is at first slight and unaccompanied by clinical signs ; it progresses usually slowly, exceptionally rapidly, and the intensity of the meningeal lesions discloses itself by the number of cells and by their quality. Leucocytes in a state of full vitality are indicative of lesions which, if not recent, are at least active ; but plasma cells, dead cells, mulberry cells indicate older and chronic lesions showing a tendency to sclerosis.

As the cellular reaction develops the albumin content gradually increases. At first the increase is parallel to that of the cells 0.40 gm., 0.60 gm., 0.80 gm., 1.0 gm. and rarely 1.20 gm. or even 1.30 gm. As the condition advances the two reactions tend to oppose one another; at death or in a chronic condition there is a limited number of cells (about 100) and an increase of albumin (0.40 to 0.50 per cent.).

Observation of the amount of albumin in the spinal fluid is a matter of capital importance, as this is the only factor on which one can place complete reliance from the point of view of prognosis. The author states that he will not hazard an opinion regarding the origin of the hyperalbuminosis, as his researches on this matter have not been convincing. He believes that part of it comes from the blood and part from the nervous system itself.

Then follow details of 75 of the oldest cases in whom it has been possible to make methodical and regular observations on the spinal fluid and to trace the evolution of nervous disease. The patients are divided into two groups: Group A, who exhibited at the first puncture a normal spinal fluid; and Group B in whom at the first examination the spinal fluid was altered. [These details, which are very interesting, and are illustrated by graphs showing the progressive changes, should be consulted in the original.]

Analysis shows the necessity of systematic examination of the spinal fluid. In the author's cases puncture was made every three months during the first year, each six months during the second year and thereafter annually. On some occasions it enabled a diagnosis to be made when blood examination and gland puncture were negative. It enabled an opinion to be formed regarding the stage of the disease and finally it enabled a decision to be reached on the proper therapeutic measures to be followed.

W. Y.

DUBOIS (A.). Remarques d'ordre historique à propos de la rachicentèse dans la trypanosomiase humaine. [**History of Lumbar Puncture in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 289-290. [2 refs.]

The author wishes to correct SICÉ when he states that LEFROU and OUZILLEAU were the first, in 1922, to emphasize the importance of lumbar puncture for the diagnosis of the period of sleeping sickness and for the control of treatment. BRODEN and RODHAIN were in reality the first to draw attention to the importance of lumbar puncture in their papers published in 1908 and 1909; and since this time lumbar puncture has been a common practice at Leopoldville. Dubois also mentions that so early as 1911 he made frequent use of lumbar puncture during his three or four monthly tours of the river villages in the Congo for the diagnosis and treatment of sleeping sickness.

W. Y.

SICÉ (A.). La rachicentèse dans la trypanosomiase humaine. A propos de la note de A. Dubois. [**Lumbar Puncture in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 582-584. [3 refs.] [Pasteur Inst., Brazzaville.]

The author replies to DUBOIS that he had not overlooked the work of BRODEN and RODHAIN, but that he had simply chosen to cite that

of LEFROU and OUZILLEAU, because it appeared to him to be the more weighty. He also refers to DUBOIS' query whether the spinal fluid in trypanosomiasis is, as Sicé said in his earlier paper, always like "eau de roche" [spring water]. DUBOIS remarked that in cases of notable cellular reaction it might be opalescent. Sicé considers that the qualification "notable" requires definition. He himself had always found the fluid clear even when the cell content was as great as 1,000 to 2,000 per cmm. and even in the few cases seen where the count varied between 2,000 and 5,000 cells per cmm. He quotes one case where the count was only 355 cells per cmm. and yet the spinal fluid was cloudy; from this fluid, however, pneumococci were isolated.

W. Y.

SICÉ (A.). Chlorurorachie et glycorachie dans la trypanosomiase humaine. [**C.S.F. Content in Chlorine and Sugar in Human Trypanosomiasis.**—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 640-650. [20 refs.] [Pasteur Inst., Brazzaville.]

The author has examined the chlorine and sugar content in the spinal fluid of cases of sleeping sickness.

The determination of the chlorides was made by Mestrezat's method. The solution of silver nitrate used was adjusted for a solution consisting of 2 cc. of fused sodium chloride 10 gm. to the litre, 10 cc. of distilled water and a few drops of an indicator consisting of 10 per cent. potassium chromate: the solution of silver nitrate was so arranged that 10 cc. exactly were required for the above solution. In the test the 2 cc. of sodium chloride (10 gm. to the litre) solution was replaced by 2 cc. of spinal fluid: the number of cc. of the standard silver nitrate solution required then gave the number of gm. of sodium chloride per litre in the spinal fluid.

The sugar determination was made by Mestrezat's modification of Benedict and Osterberg's method.

The following are among the conclusions:—

In nervous trypanosomiasis the spinal fluid is modified not only by the leucocyte reaction and increase in albumin, but by a diminution in the quantity of chlorides and sugar.

This diminution indicates the state of the lesions and the progress of the infection.

Efficacious treatment limits the diminution of chlorides and sugar, and both tend to become more regular in amount. Exceptions, when they occur, are generally amongst the incurables, and when such are encountered the prognosis ought to be very guarded.

W. Y.

GILL (C. W. Hope). **The Tube Method of Gland Puncture in Sleeping Sickness.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 643-644.

The author describes a substitute for the use of the ordinary syringe for the purpose of gland puncture and enumerates various advantages which he considers his apparatus to possess. It is as follows:—

"The substitute for the syringe consists of about 2 ft. of small diameter rubber tubing cut in half and rejoined by the bulb portion of a 5 c.cm. pipette. Into one free end is now inserted a glass mouthpiece (as used with blood count pipettes), and into the other the socket of a small hypodermic needle."

W. Y.

ARNAUD (R.). Au sujet du moranyl. Deux opérations de moranylisation dans le Moyen-Congo. [Moranyl. Results of its Prophylactic Use in the Middle Congo.]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 872-880.

The observations referred to were made in two districts of the subdivision of Sibiti in the Middle Congo, viz., Goma-Sangha and Boungou-Pandi, where the percentage of infected in September, 1927, was respectively 51.8 and 74. The following instructions were given to BASILE in performing the test :—

1. To make a very careful survey in order to avoid injecting early cases of sleeping sickness.
2. To give the healthy an injection of moranyl to the amount of 1 gm. in 5 cc. of water, i.e., 2 cgm. per kilo.
3. To atoxylize or re-atoxylize all the infected.
4. To keep the pregnant females as control.

The injections were made on November 12th by BASILE and his assistants as follows :—

	Seen.	Injected.	Not injected.
Goma-Sangha	709	333	45
Boungou-Pandi	587	230	27
	1,296	563	72

Details are given concerning the re-examination of these people about a month and 13 months later. From the tables it appears that as high a proportion of the moranylized were infected as among the non-moranylized, i.e., about 18 per cent. for each category.

This unexpected result, which is at variance with the observations of BOSSERT and TRÉVISE [see this *Bulletin*, Vol. 24, p. 959], caused the author to consider possible fallacies. Three factors seemed to him capable of influencing the results, viz.: insufficient preliminary examination which might cause certain early cases to be overlooked; the preparation of the solution; and, lastly, the dosage given. Whilst it is possible that errors in each of these three proceedings might have operated, it is in the last that the author believes the main fault to lie. BASILE and his assistant had no scales and could not weigh their patients, and consequently the dose given was often quite inadequate. The 450 moranylized seen by Arnaud at the second examination, i.e., 13 months after the injections, were all weighed and the dose of moranyl given calculated per kilo of body weight. The following analysis of the result is given :—

Dose of moranyl received per kilo. of body weight.	Number injected.	New cases.	Percentages.
0.02 gm.	25	0	0
0.02 to 0.015 gm.	57	4	7
0.015 to 0.01 gm.	247	41	17
less than 0.01	121	39	32

The result is striking: no case receiving 0.02 gm. per kilo. became infected, whilst a third of those who recorded 0.01 gm. and less did become infected.

Details are next supplied of an experiment with moranyl given orally. This experiment which was performed in 1927 has given encouraging results. In view of the importance of dosage, as shown by the previous work, the patients were given, instead of a single dose of 4 gm., 0·08 gm. per kilo in 4 doses of 0·02 gm. All the cases were subject to a very careful preliminary examination. Of the 226 cases dealt with 209 received the four doses and 17 only three. When re-examined 7 months later only 4·8 per cent. of the moranylied were found to be infected, whereas the percentage infected among the non-moranylied was 38.

The author concludes that in moranyl we have a potent prophylactic and adds that it is unfortunate that the drug is so dear.

FOURNEAU, who took part in the discussion following the paper, remarked that, although the price of the drug is very high, this fact should not stop the investigation and that he was convinced that, as the demand increased, the price would fall.

W. Y.

JAMOT (E.) & CHAMBON. Contribution à l'étude du pouvoir préventif du 205 Bayer-309 Fourneau, contre la maladie du sommeil. [**Preventive Power of Bayer 205 against Sleeping Sickness.**]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 491-499. [1 ref.]

The authors have attempted to confirm the work of BOSSERT that 309 Fourneau has a prophylactic value against sleeping sickness [this *Bulletin*, Vol. 24, p. 959]. His experiment was conducted along precisely similar lines to that of BOSSERT. Certain villages of the Badjougé tribe of the subdivision of Lomié were examined in 1926, and found to be infected to the extent varying from 24·8 to 78·6 per cent. of the population, average 46·5 per cent. The infected were at this visit given a series of six injections of atoxyl. In April, 1928, the district was again visited and the percentage of infected was found to vary from 42·9 per cent. at one village to 63 per cent. at another. The diagnosis was made by blood examination and gland puncture. The number of new cases showed the epidemic to be in full swing.

After this second examination the healthy population was divided into two groups—one group destined to receive the drug and the other to serve as a control. All syphilitics, those suffering from yaws, pregnant women and the old and feeble were excluded. In all, 604 individuals were treated with a prophylactic injection of the drug; 301 received 0·02 gm. per kilo. and 273 were given 0·04 gm. per kilo. The controls numbered 561. It should be added that all the infected in the district were given six injections of atoxyl before the experiment.

Eight months later the population was re-examined. Of the 604 who received the moranyl, 565 were found and of the 561 controls 498. Among the 565 who had been given the drug 174 had become infected (30·7 per cent.) and among the 498 controls 152 (30·5 per cent.).

In a somewhat similar experiment the drug was given by the mouth in doses varying from 2 to 8 cgm. per kilo. Here also the experiment was a failure. The results are set out in detail in a series of tables.

W. Y.

VAUCEL. Traitement de la trypanosomiase humaine par l'atoxyl, la tryparsamide et le 270 Fourneau. Résultats acquis en Afrique Équatoriale française. [**Treatment of Human Trypanosomiasis by Atoxyl, Tryparsamide and Fourneau 270.**]—*Ann. de Méd. et de Pharm. Colon.* 1929. July-Aug.-Sept. Vol. 27. No. 3. pp. 403-415.

Since 1906 atoxyl has been the basal drug for the treatment of sleeping sickness in French Equatorial Africa, but in 1922 tryparsamide began to be tried and subsequently was more and more employed.

Atoxyl. Method of small doses.—As a result of the observations of KOCH in 1907 that too large, or too frequently repeated, doses of atoxyl were apt to produce blindness, the doses at first employed at Brazzaville were very small—0.01 gm. per kilo. of body weight every 7 days. Thus from 1906 to 1920 the patients were treated with weekly doses varying from 0.5 to 0.75 gm. sometimes alone, and sometimes associated with emetic or novarsenobenzol. The results were very unsatisfactory; cures were not obtained and relapses were common. In 1917 LEBOEUF summarized the results obtained from the use of small doses of atoxyl. Between 1906 and 1917, 2,340 cases of sleeping sickness were under treatment for more or less prolonged periods; for various reasons 810 could not be followed up. Of the 1,530 kept under treatment and observation 275 (18 per cent.) were discharged, 314 (10.5 per cent. [? 20] were alive and living at home, 458 (30 per cent.) had disappeared and 483 (31.5 per cent.) were dead. Finally, in almost all cases relapses were common and hence the method was of no prophylactic value. These unsatisfactory results caused OUZILLEAU to institute the method of large doses—15 to 20 mgm. per kilo. of body weight.

Method of large doses.—The favourable results attending this method caused it to be generally adopted and the drug was given in two doses of 0.02 gm. per kilo. at ten days' interval and repeated as far as possible each half year. In 1923, BLANCHARD and LAIGRET amplified this method, and proposed to group the injections in series of six at 10 day intervals. This massive dosage could not, however, be given to patients in the later stages of the disease because it produced blindness and other grave symptoms of intoxication. Of the 1,118 patients so treated at Brazzaville between 1920 and 1928, 663 were kept under observation in an adequate manner. The results are summarized in a lengthy table from which it appears that 37.8 per cent. were cured, 36.8 per cent. died, 10.8 per cent. disappeared, and 0.1 per cent. were improved. Limiting the observations to those in the first stage of the disease we find that 60 per cent. were cured, 15 per cent. presented trypanosomes in the blood after treatment, and in 25 per cent. the disease continued its evolution. Among those in the second stage of the disease 0.8 per cent. were cured, 0.4 per cent. improved, 78 per cent. died, and 15 per cent. disappeared.

Tryparsamide.—This drug was first used at Brazzaville in 1922, and was to begin with restricted to patients in the second stage. The patients were divided into the following 4 categories according to the condition of the spinal fluid:—

- 1st Category. Lymphocytes 15 to 70.
Albumin > 0.25 < 0.50.
Nervous symptoms absent.
- 2nd Category. Lymphocytes > 70.
Albumin > 0.50.
No trypanosomes in spinal fluid.
- 3rd Category. Lymphocytes > 70.
Albumin > 0.50.
Trypanosomes present in spinal fluid.

4th Category. Lymphocytes > 70.

Albumin > 0.50.

Trypanosomes present in spinal fluid.

Marked clinical signs : terminal stage.

The first group of cases treated consisted of 95 patients. The course was quite insufficient owing to the difficulty of obtaining supplies of the drug. The immediate results were impressive and the mortality at the hospital in 1925 fell from 36 per cent. to 7.6 per cent.

In 1926, LEDENTU recorded results in 64 patients observed for an average of 15 months after treatment. Details are given in a table : the successes were Category I, 100 per cent., Category 2, 82 per cent., Category 3, 45 per cent., and Category 4, 50 per cent. In 1927, LEDENTU and Vaucel reported on the results of treatment of 165 other cases ; these records are similar to those of LEDENTU.

All these patients were treated with weekly injections of the drug in doses gradually rising from 0.015 to 0.06 gm. per kilo of body weight ; each series consisted of seven injections and was followed by a rest of 45 days. After each series of injections the spinal fluid was examined, and the information thus obtained has suggested the following inferences :—

1. The decline of the lymphocytosis and albumin is constant ; as a result of the first series of injections of about 0.3 gm. per kilo of body weight.

2. The gradual and definite diminution of the albumin alone warrants a good prognosis.

3. The cessation of this decrease and its remaining in the vicinity of 40 per cent. indicates a guarded prognosis, because it is often very difficult to continue the reduction by further series of injections.

4. Further series of injections may, in certain cases, cause the reduction of marked hyper-lymphocytosis and hyper-albumen content ; the cerebro-spinal fluid returning to its primitive abnormal composition or even surpassing it.

5. This may sometimes co-exist with a surprising conservation of the general health, reminding one of a simple toxic meningeal reaction. Then suddenly there appear tremors, spasmodic contractures, epileptiform contractures, etc., and the trypanosomes reappear in the spinal fluid, sometimes even in the course of treatment. Tryparsamide has lost its power and the patient goes steadily down hill.

6. Ocular troubles may appear at any stage of the disease, but are more common in the later cases and in those previously treated with arsenicals. They disappear if the drug is immediately stopped : the dose which provokes them is never less than 0.04 gm. per kilo. The authors have encountered only two cases of complete blindness in all their experience.

Details are given regarding the treatment of 129 cases : Of these, 30.1 per cent. were considered cured, 6.02 improved, 3.01 failures, 6.02 died, 54 per cent. were in such a state as to warrant the hope of a cure, and 0.7 per cent. gave indication of failure. The sense in which these terms are used is defined.

"*Fourneau 270.*"—Between 1925 and the end of 1927, 37 patients in the first stage of the disease were treated with this drug. Of these 23 received an adequate course of treatment ; and only one has relapsed 8 months after 0.43 gm. per kilo. Apparently 96 per cent. were permanently cured.

During the same period, 85 cases in the second stage were treated with *Fourneau 270*. None of them exhibited a blood relapse. The author believes that the dose should never exceed 0.04 gm. per kilo. The action on the meningeal lesions, although manifest, does not appear to be so marked or of such duration as that of tryparsamide.

Of 63 cases in the second stage treated by Fourneau 270 and adequately observed 55 per cent. were cured, 22.2 improved, 7.9 were failures, and 14 per cent. died. Those who died were almost all in the terminal stage of the disease. Amongst the accidents noted were albuminuria, amblyopia and amaurosis. As the result of years of experience the authors recommend the following methods of treatment:—

Patients in the first stage. Fourneau 270 up to an amount of 0.3 gm. per kilo of body weight. Failing this drug large doses of atoxyl should be given.

Patients in the second stage. Tryparsamide in doses of 0.015 to 0.035 gm. per kilo. of body weight continued until the spinal fluid becomes normal.

W. Y.

FISCHER (Otto) & KUNERT (Herbert). Untersuchungen ueber die Behandlung der menschlichen Schlafkrankheit mit peroralen Gaben von "Bayer 205." (Vorläufige Mitteilung.) [**Investigations on the Treatment of Sleeping Sickness by Oral Administration of Bayer 205.**]*—Arch. f. Schiffs- u. Trop.-Hyg.* 1930. May. Vol. 34. No. 5. pp. 252-254. [Inst. for Ship & Trop. Diseases, Hamburg.]

Many cases of sleeping sickness (both new and old) were treated by oral administration of Bayer 205 at the Moravian Mission in Sikonge south of Tabora. The dose given was 2 gm. to 3 gm. repeated until a total of 10 gm. to 12 gm. had been taken within 8 to 10 days. The drug was administered either in solution or in cachets.

The immediate result was excellent; trypanosomes quickly disappeared from the blood and there was a marked improvement of symptoms. In the great majority of cases, however, a relapse occurred within 6 to 8 days. In view of this, and of the fact that the oral administration was well tolerated, the quantity given was increased to three doses of 4 gm. or 5 gm. each, but the result was the same. A series of observations indicated that a dose of 3 gm. upwards orally caused the trypanosomes to disappear from the blood about as quickly as a dose of 1 gm. given intravenously or intramuscularly.

W. Y.

WALRAVENS (P.). L'émétique par voie buccale dans le traitement des trypanosomiases. [**Tartar Emetic per os in the Treatment of Trypanosomiasis.**]*—Ann. Soc. Belge de Méd. Trop.* 1930. Mar. 31. Vol. 10. No. 1. pp. 85-86. [Bact. Lab., Elisabethville.]

The author points out that in cases exhibiting optic atrophy and in some infections of *T. rhodesiense* tryparsamide cannot be used; in such cases combined treatment with Bayer 205, and emetic is very advantageous. Unfortunately, the latter drug is dangerous in the hands of unskilful people and it occurred to the author to ascertain whether it was possible to administer it by the mouth instead of intravenously. It was decided to give the emetic in the form of albuminated pills as recommended by WALKER for the treatment of bilharzia. This form of treatment was tried in three cases of sleeping sickness, but had to be abandoned since the drug was not absorbed sufficiently rapidly to produce peripheral sterilization.

W. Y.

DUBOIS (A.). A propos du mode d'action de la tryparsamide sur les trypanosomes. [**Mode of Action of Tryparsamide on Trypanosomes.**—*Ann. Soc. Belge de Méd. Trop.* 1930. Mar. 31. Vol. 10. No. 1. pp. 87-94. [6 refs.] [School of Trop. Med., Brussels.]

Atoxyl and arsacatin are trypanocidal only *in vivo* and not *in vitro*, and the same holds true of tryparsamide, another pentavalent arsenical compound. After briefly discussing the two main theories which have been advanced to explain this fact reference is made to the work of LEVADITI, who found, when atoxyl is treated with extract of liver, a substance is formed which is trypanocidal *in vitro*. In the present work Dubois has enquired whether tryparsamide can likewise be activated by treatment with liver extract.

LEVADITI'S technique was followed. A guineapig was killed by exsanguination, the liver removed aseptically and ground up with 20 cc. of physiological saline. The liquid obtained was added, either immediately or after standing for an hour, to an equal volume of a 10 per cent. solution of tryponarsyl (Meurice) [Belgian tryparsamide]. The final titre of the arsenical was thus 5 per cent. and less according to its dilution with the trypanosome suspension. The author states that this concentration of tryponarsyl is inactive *in vitro*. The mixture was placed in the incubator for 1½ to 3 hours and sometimes allowed to stand at lower temperatures for some hours longer. The liver extract and solution of tryparsamide served as controls.

The trypanotoxyl was then tested regarding its direct action on a suspension of trypanosomes. The parasites were maintained on the following medium.—Bouillon 100 cc., NaCl 65 cgm., glucose 25 cgm. Experiments showed that in this medium the trypanosomes would remain alive for at least 12 hours. The parasite used was a strain of *T. pecaui* which in guineapigs and mice was very susceptible to the action of the drug. Whilst the solution of tryponarsyl and the liver extract had no action on the trypanosomes in 2 to 6 hours, the product obtained by the action of liver on tryponarsyl gave evidence of a toxic action in 15 mins. Even with dilutions of 1 : 4 and 1 : 8 the toxic effect was noticeable in 1 hour.

It was found that even when the trypanotoxyl had been kept in the cellar for 15 days it was still active ; and that an alcohol extract could be prepared which would retain, in the dried condition, its activity for at least 5 months.

The spleen, muscles and blood, although acting to some extent on tryponarsyl, were much inferior to liver. Bayer 205, which is inactive *in vitro*, could not be activated by organ extracts.

The author then prepared an arsenic resistant variety of his strain of *T. pecaui* and on testing this *in vitro* found that it was definitely resistant to his liver tryponarsyl product, whereas when tested against myosalvarsan, it exhibited little, if any difference from the normal strain.

Dubois next attempted to demonstrate the formation of trypanotoxyl *in vivo*. These experiments were of two kinds : in the first, normal and infected guineapigs were injected with 0.5 to 1 gm. of drug per kilo. and sacrificed in 3 to 4 hours and the evidence of the presence of trypanotoxyl sought in the blood and organs ; in the second, the drug was injected into guineapigs containing numerous trypanosomes and the parasites removed after ½ to 2 hours and watched *in vitro*. Both lines of work provided only negative results.

W. Y.

BARLOVATZ (A.). L'arsénorésistance dans la trypanosomiase humaine. [**Arsenic Resistance in Human Trypanosomiasis.**—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 291-295.

This paper is called forth by the article of VAN DEN BRANDEN [*ante*, p. 228], who denied that arsenic resistance was the true explanation

of the failures obtained by Barlovatz in the treatment of certain cases of sleeping sickness with tryponarsyl [this *Bulletin*, Vol. 26, p. 708] and considered that the failure was due to insufficient dosage.

Barlovatz complains that VAN DEN BRANDEN quite arbitrarily, and as the result of purely personal observation, has fixed the minimum dosage of tryparsamide at 30 gm. ; and points out that many authors have used a total dosage of 25 gm. and some even much less. He recalls that KELLERSBERGER treated 100 patients at Katanga with 25 gm. and obtained 100 per cent. successes. He himself generally gave 4 courses of 24 gm., and more for very advanced cases ; the average quantity given to a patient was over 100 gm.

The "arsenic-resistant" cases recorded in the author's previous paper received on an average 38 gm. of tryponarsyl, which VAN DEN BRANDEN referred to as puerile. Barlovatz states that the medical man working in the field could not possibly give 200 gm. of tryparsamide in interrupted courses to patients with altered spinal fluid. It is of more interest to know what proportion of successes can be obtained with the most modest treatment that it is practicable to give. VAN DEN BRANDEN is mistaken when he attributes to his own observations an absolute value. The percentage of successes varies greatly in different countries even though the same treatment be given.

Cases of arsenic-resistance are undoubtedly rare, the author having encountered to the end of 1928 only about 50 among 4,000 patients. In the autumn of 1929, whilst re-examining a zone containing 600 cases some 8 months after the previous examination, the author encountered 6 cases with gland relapses. One of these patients who had been quiescent since 1926 was set aside. The remaining five, who had all received recent courses of tryparsamide terminating respectively 6 days, 10 days, 1 month, 4 months and 5 months previously, were all given 90 cgm. of rhodarsan (914) and then one or two doses of 2 gm. of tryparsamide. In one patient the 914 caused a temporary disappearance of the parasites, but the others were not sterilized. This fact caused the author to substitute non-arsenical drugs, viz., emetic and germanin.

Barlovatz states that he does not doubt that tryparsamide gives a greater proportion of successes than any non-arsenical preparations, but he maintains that when it fails in a patient it is useless to persist with it. During 1926 and 1927 he has treated many patients with prolonged courses of tryparsamide, notwithstanding the fact that the glands were not sterilized, and has seen them pass into the second stage of the disease. In such cases the combination of emetic and germanin alone arrested the progress of the disease.

The author states that he is unable to subscribe to the statement of VAN DEN BRANDEN that Bayer 205 and atoxyl are incapable of producing a cure of patients in the second stage of the disease. He cites instances of such cases and also of cases in the second stage apparently cured by emetic and germanin.

In conclusion Barlovatz considers that in the Mayumbe district at least "arsenic resistance" is a definite phenomenon which has to be reckoned with in the treatment of sleeping sickness and which indicates the necessity in certain cases of combining with tryparsamide, or of substituting for it, some non-arsenical preparation.

ARNAUD (R.). Au sujet de l'arsénorésistance de la trypanosomiase humaine. [**Human Trypanosomiasis and Arsenic Resistance.**]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 461-463.

The author has read with interest the recent polemic between BARLOWATZ and VAN DEN BRANDEN [see above], and as one who works in the bush, he desires to reply to the article of BARLOWATZ. He considers that the truth of arsenic-resistance nobody will deny—no one less than VAN DEN BRANDEN. It is not without reason that VAN DEN BRANDEN has laid down that the minimum course of tryparsamide should be 30 gm. He agrees with BARLOWATZ that many cases have been cured with less amounts of the drug, but such cases are exceptional. Arnaud cannot agree that it is impossible for a medical mission in the field to administer the dose recommended by VAN DEN BRANDEN and states that in the field in which he labours such courses are habitually given. He works under conditions which are probably more precarious than those obtaining in the Belgian Congo, but he finds no difficulty in keeping the patients in the treatment centre provided they are well fed and lodged and properly looked after.

BARLOWATZ's statement that patients with altered spinal fluid can be sometimes cured with atoxyl is news to the author; he has not seen any such cases. He is also astonished at the doses of moranyl employed by BARLOWATZ; doses of 10 to 20 gm. in his hands produced renal and other disturbances. The paper concludes with the opinion that the question of arsenic-resistance is a very important one and that, notwithstanding his criticisms, BARLOWATZ has done well to raise a matter of such practical interest.

W. Y.

VAN DEN BRANDEN (F.). L'etharsénol et le proparsénol dans le traitement de la trypanosomiase humaine. [**Etharsanol and Proparsanol in the Treatment of Human Trypanosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1930. Mar. 31. Vol. 10. No. 1. pp. 1-23. [2 refs.] [Leopoldville Lab., Leopoldville, & School of Trop. Med., Brussels.]

The author has tested the therapeutic value in cases of human trypanosomiasis of two new pentavalent arsenicals—etharsanol and proparsanol—obtained from STRATMAN-THOMAS of Wisconsin [this *Bulletin*, Vol. 26, p. 199]. Although nothing definite was known regarding posology, the dose recommended was 1 to 2 gm. for an adult; both products are soluble in water and 10 to 20 per cent. solutions were used for intravenous injections.

Etharsanol. As in the case of tryparsamide an injection of 2 gm. produced peripheral sterilization within a few hours. The duration of this sterilization in one patient was 35 days. Of the 27 cases treated with this drug 6 had a normal spinal fluid. In one of the patients visual disturbance appeared after 8 gm. had been given, and in a second case the treatment had to be stopped after the administration of 30 gm. for a similar reason. One patient in the first stage of the disease appeared to be cured by 22 gm., and in two others also in the first stage peripheral sterilization appeared to be permanent and the spinal fluid to remain normal after respectively 20 gm. and 32 gm. of the drug. One case relapsed three months after a course of 20 gm.

The remaining 21 chronic cases had not previously received any treatment. Of these, unfortunately, 12 exhibited ocular troubles after they had

received doses varying from 20 gm. to 56 gm. of the drug. Details are given of all 27 cases.

Proparsanol. As the quantity of this drug was limited he was unable to give a sufficiently long course and was obliged to continue the treatment with etharsanol. Twelve chronic cases were treated with the drug, the total amount given being 20 gm. for an adult and 10 gm. for an adolescent. In one case the lymphocytosis in the spinal fluid increased from 14.2 to 15.2 per cmm. after the administration of 13 gm.; but in all the other cases there was a diminution both of the lymphocytes and of the albumin. Here again a number developed visual disturbance. Details of the cases treated are given.

The general conclusion reached is that although the therapeutic power of these drugs is of the same order as that of tryparsamide, the fact that they readily produce optical disturbance must prevent their use in the treatment of human trypanosomiasis.

W. Y.

GIEMSA (G.). Ueber chemotherapeutische Studien mit einer neuen, für die Behandlung der Schlafkrankheit und anderer Trypanosen aussichtsreichen Benzolarsinsäure ("Arsenpräparat 4002"). [**Chemotherapeutic Studies with a New Benzol Arsinic Acid "Preparation 4002."**—*Beihfte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 130-142 (214-226). [13 refs.]

The drug is crystalline, colourless, odourless and tasteless and can be either injected or given orally. It is well tolerated in large doses by men and large animals, and mice can be given 100 mgm. subcutaneously and 200 mgm. orally. For infected mice the chemotherapeutic index is from 1 : 10 to 1 : 16, as compared with tryparsamide 1 : 2 and atoxyl 1 : 1. The drug clears the blood of mice with remarkable rapidity : in many infections the parasites have disappeared from the peripheral blood within 20 minutes.

A few preliminary clinical trials have been conducted on cases of sleeping sickness in the Cameroons. Five old standing cases [lumbar puncture was not performed] were treated with "4002." One of these patients had not previously been given any treatment, but the other 4 had had five injections of tryparsamide ten months previously and had relapsed. In all, five trypanosomes were found at the time of treatment in the gland juice or blood. The drug was given in 10 per cent. solution intravenously, two patients receiving 1 gm. and the other three 1.5 gm. In four the injection was repeated after an interval of a week. In all cases the trypanosomes had disappeared within 24 hours and there was no relapse within the observation period (8 to 13 days).

W. Y.

- i. LAUNOY (L.) & ENGLER (A.). *Éléments pour servir à l'étalonnage de quelques composés arsenicaux pentavalents à pouvoir trypanocide.* [**Data for Standardization of the Trypanocidal Effects of Certain Arsenical Compounds.**]—*C.R. Soc. Biol.* 1930. May 9. Vol. 104. No. 15. pp. 66-68.
- ii. — & —. *Étalonnage des composés arsenicaux pentavalents d'après une unité trypanocide choisie.* [**Standardization of Pentavalent Arsenical Compounds based on a Chosen Trypanocidal Unit.**]—*Ibid.* pp. 69-71.

i. The data furnished in this paper were obtained with the object of comparing the pentavalent arsenicals, atoxyl, tryparsamide and orsanine

(270 Fourneau). In two tables the toxicity of each of these compounds, when administered intravenously, is given for the rabbit and mouse. In these tables the dose which is lethal in 100 per cent. of cases is given, as is also the minimal lethal dose; the authors write that between these two extremes all sorts of intermediate results are obtained and they record two of them, viz., the dose exceptionally supported and the dose tolerated by 50–60 per cent. of animals. In a third table the curative dose for mice infected with *T. brucei*, *T. evansi* and *T. equiperdum*, respectively, is given. The mice were treated 24 to 48 hours after infection with *T. brucei* or *T. evansi* and 48 hours after infection with *T. equiperdum*. The curative dose, which is calculated per 20 gm. of mouse, is considered to be that which prevented relapse for 30 days in 90 to 100 per cent. of the mice. The table brings out the interesting fact that whilst this dose is, in the case of orsanine, constant (3 mgm.) for each of the three infections, it varies somewhat in the case of atoxyl and tryparsamide according to the infection. The expression "dose trypanocide trivalente" is used for that dose which would apply to all of the three infections.

From the data thus obtained the authors proceed to calculate the coefficient of experimental trivalent trypanocidal activity, i.e., a fraction consisting of the trivalent curative dose as the numerator and the dose tolerated by 60 to 50 per cent. of animals as the denominator $\frac{\text{D.C. tr.}}{\text{D. tol. 60-50}}$. For atoxyl this was found to be 1/1.4, for tryparsamide 1/4.1, and for orsanine 1/8.3.

ii. Since the three drugs in question are not of the same molecular weight, the coefficient given above does not allow of their comparison. The authors have, however, devised a method whereby it is possible to obtain a comparison. They have taken atoxyl as the standard. Assuming 5 mgm. is the trivalent trypanocidal dose of this drug, it is possible to transform, in order to compare their value, the results obtained with the other products into units of "trypanocides trivalentes-atoxyl." Atoxyl with 4 molecules of water has a molecular weight of 311, tryparsamide with $\frac{1}{2}$ mol. of water 305, and orsanine with 5 mols. 387. From this it follows that 1 gm. mol. gm. of atoxyl equals 0.98 gm. mol. gm. of tryparsamide, and 1.24 gm. mol. gm. of orsanine. On this basis the equal trivalent trypanocidal doses would be atoxyl 0.005 gm., tryparsamide 0.0142 gm. and orsanine 0.00241 gm.

The numbers can be compared with one another and one can say that: 1 gm. mol. gm. of atoxyl contains in atoxyl 200 trivalent trypanocidal mouse units; 1 gm. mol. gm. of tryparsamide 70 units; and 1 gm. mol. gm. of orsanine 418 units. From this it follows that if we represent the trypanocidal power of atoxyl as 1, then that of tryparsamide will be 0.35 and that of orsanine 2.07.

W. Y.

- i. LAUNOY (L.) & PRIEUR (M.). Premiers résultats relatifs à l'étude du mécanisme de l'action trypanocide du 205 Bayer-309 Fourneau. [Study of Trypanocidal Action of Bayer 205-Fourneau 309.]—*C.R. Soc. Biol.* 1930. Feb. 21. Vol. 103. No. 7. pp. 478–481. [3 refs.]
- ii. — & —. Résistance de *Trypanosoma brucei* au 205 Bayer-309 Fourneau chez le lapin et avirulence pour la souris. [Resistance of *T. brucei* to Bayer-Fourneau in the Rabbit and Non-Virulence for Mice.]—*Ibid.* pp. 481–483. [1 ref.]

i. Earlier work on the mechanism of the trypanocidal action of 205 Bayer-309 Fourneau has evoked two hypotheses, viz.: the cellular theory and the humoral theory. The former, which was evolved by MAYER and ZEISS and supported by many other workers, postulates

that the drug renders the parasites incapable of division ; consequently, the trypanosomes are avirulent when transferred from a treated animal to another. Certain work of BRUMPT on *T. inopinatum* threw doubt on the correctness of this hypothesis. The authors recall that MAYER and ZEISS, and NAUCK, used massive doses of the drug in their experimental work ; they believe that a clearer insight into the mechanism of the action of the drug would be obtained from the use of liminal doses.

Details are given of four experiments—two with rabbits, one with a cat and one with mice—in which the animals were infected with *T. brucei* and then treated with small doses of Bayer 205 ; at intervals varying from a few minutes up to 24 hours after treatment subinoculations were made into mice.

The following are the conclusions :—

1. The injection of liminal doses of Bayer 205 into infected rabbits or cats very rapidly renders the virus avirulent for mice. This avirulence for mice may co-exist with multiplication of the parasites in the treated rabbit or cat.

2. The blood of infected mice, treated by liminal sterilizing doses of Bayer 205, remains virulent for animals of the same species, up to the time when parasites can no longer be detected in the blood.

3. The action of Bayer 205 on the reproductive capacity of the parasites (anti-schizogony) does not, even if it exists, seem to be an essential character. It does not appear to be necessary and in any case it alone does not suffice to explain the trypanocidal action of the drug.

4. The trypanosomes transferred from mice treated with Bayer 205 to healthy mice are not resistant to the drug.

5. The infection of fresh mice with *T. brucei* rendered avirulent for the mouse by the injection of Bayer 205 into infected rabbits or cats does not cause the mice to be immune to a virulent strain of *T. brucei*.

- ii. In the course of the work on the mechanism of the trypanocidal action of Bayer 205, the authors encountered an instance of resistance of the virus to the drug. A rabbit, infected with *T. brucei*, was given shortly afterwards a dose of 0.05 gm. per kilo. of Fourneau 309. Five hours later parasites (1–10 fields) were still seen in the blood ; two mice were subinoculated with negative results. For the next 10 days the blood was negative ; on the eleventh day there was a relapse and on the sixteenth day 5 or 6 parasites were seen to a field ; 4 mice were inoculated, again with negative results. Two days later 8–10 parasites were seen to a field and three more mice were inoculated also with negative results ; approximately the same state of affairs was encountered on the twentieth day, parasites being seen in the blood in considerable numbers, but failing to infect when inoculated into mice. On this day the rabbit was given a second dose of 0.05 gm. per kilo. of Fourneau 309. This, however, failed to cause the disappearance of trypanosomes from the rabbit's blood, but subinoculations of the parasites into 3 mice and a rabbit failed to infect. Further details are given.

The authors believe that this observation supports the third conclusion of their previous note, viz., that the trypanocidal action of Bayer 205 cannot be explained solely by its action on the reproduction processes of the parasites.

W. Y.

LAUNOY (L.), NICOLLE (P.) & PRIEUR (M.). Recherches sur la thérapie et la prévention du nagana expérimental de la souris et du chat avec le 205 Bayer-309 Fourneau. [*Treatment and Prevention of Experimental Nagana in Cat and Mouse with Fourneau 309.*]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 630–640. [2 refs.]

It was found that Fourneau 309 exerted a definite prophylactic action in cats against infection with *T. brucei* : this action was in some degree related to the dose of the drug given, but the duration of the refractory state in the

cat was not arithmetically proportionate to the dose. For example, it was found that after 0.02 gm. per kilo. the protection lasted 79 to 140 days and after a dose of 0.04 gm. per kilo. 157 days. From these facts it is concluded that if the dose chosen be 0.02 gm., the protection injection should be repeated every 60 to 90 days and if the dose be 0.04 gm. every 90 to 150 days.

W. Y.

COLLIER (W. A.) & KRAUSE (Magdalene). Zur Abortivheilung der Schlafkrankheitsinfektion der weissen Maus. [**Abortive Cure of Sleeping Sickness Infection of White Mice.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1930. Apr. 17. Vol. 111. No. 2. pp. 191–197. With 1 text fig. [5 refs.] [Robert Koch Inst., Berlin.]

As the result of his chemotherapeutic investigations, EHRLICH observed that in the occurrence of a chemotherapeutic cure besides the direct influence of the parasite the mobilization of the defensive power of the organism can play an important part. A portion of the parasites is first killed by the chemical, and the free antigen thus formed stimulates the immune-body-forming organs of the infected animal, a process which EHRLICH designated "Ictus immunisatorius."

KOLLE (1922) working with rabbit syphilis showed that during the first weeks after infection it was possible to produce sterilization by means of salvarsan treatment, but that later, as the result of changes in the reaction capacity of the body, the most intensive treatment either with salvarsan alone, or in combination with bismuth or mercury, failed to produce a lasting cure.

The authors considered it to be of interest to ascertain whether this phenomenon was encountered in other infections; especially as EHRLICH had found that in recurrent fever infection of mice a cure was obtained with smaller doses of salvarsan at the height of the infection than at the beginning—an observation which was subsequently confirmed by FELDT. *T. gambiense* infection of white mice appeared to the authors a particularly favourable infection to work with from this point of view. The strain used came from Hamburg and killed untreated mice in 4 to 6 weeks. A large series of mice was infected by intra-peritoneal injections of similar quantities of the virus and then divided into two groups. The first was treated on the 3rd day and the second on the 14th day. The drug employed was B R 34a [*ante*, p. 232]. The preparation was suspended in olive oil and dilutions varying from 1/1,000 to 1/10,000 in 1 cc. were given per 20 gm. mouse. The blood of the mice was then carefully examined for relapses, and the results of the two series of experiments are set forth in tables.

It was found that if the animals were treated on the 3rd day of the infection 1/4,000 always cured, and 1/5,000 and 1/6,000 sometimes, whilst in those treated on the 14th day a concentration of 1/1,000 was necessary to produce a certain cure and 1/2,000 only cured sometimes.

W. Y.

COLLIER (W. A.). Ueber die Wirkung der unlöslichen Arseno-Pyridin-Verbindung B R 34a auf die chronische Trypanosomeninfektion der weissen Maus. [**The Action of the Insoluble Arseno-Pyridin Compound B R 34a on Chronic Trypanosome Infections in White Mice.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. May. Vol. 34. No. 5. pp. 254–258. [6 refs.] [Robert Koch Inst., Berlin.]

Reference is made to the fact that Collier and KRAUSE [*ante*, p. 232] have already demonstrated the favourable action of this drug in *T. brucei* infec-

tions in mice. The drug was prepared by BINZ and RAETH and called by them B R 34a; it is an insoluble arseno-pyridin compound and closely allied to their preparation B R 34, the therapeutic action of which has already been reported upon by DAHMEN, GIEMSA and MAYEDA, and KLEINE [this *Bulletin*, Vol. 25, p. 346].

It was found that B R 34a had no action on *Schiz. cruzi*. infections. Against *T. gambiense* infections in white mice it was, however, extraordinarily active. Subcutaneous injections of 1/4,000 of an olive oil suspension always cured the mice and 1/5,000 sometimes; this gave a chemotherapeutic quotient of 1/40 to 1/50.

W. Y.

WRIGHT (Harold N.) & HIRSCHFELDER (Arthur D.). **Studies on the Colloid Chemistry of Antisepsis and Chemotherapy. IV. The Duplication *in vitro* of the "Interference Phenomenon" in Combination Chemotherapy.**—*Jl. Pharm. & Experim. Therap.* 1930. May. Vol. 39. No. 1. pp. 39–57. With 4 text figs. [17 refs.] [Pharmacol. Dept., Univ. of Minnesota, Rochester.]

The gist of the material contained in this article has been published elsewhere and noticed in this *Bulletin* [*ante*, p. 234]. In the present paper a full account is given of the experimental work upon which the argument is based.

The following are the conclusions :—

"1. The interference of acriflavine against the trypanocidal action of triphenyl methane dyes observed by Browning and Schnitzer in animals, a phenomenon of "drug-fastness," can be duplicated *in vitro* upon the CO₂ production of yeasts.

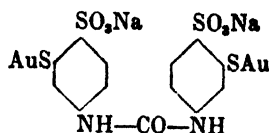
"2. This reaction appears to be a phenomenon due to adsorption of the first dye upon the surface of the cell interfering with the adsorption of the second.

"3. This analogy should furnish a means for studying further questions of drug-fastness and for further physicochemical investigation of many questions in chemotherapy."

W. Y.

FISCHL (Viktor). Ueber eine trypanozide Goldverbindung. [**On a Trypanocidal Gold Compound.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 3. Vol. 115. No. 5/6. pp. 383–386. [9 refs.] [Psychiat.-Neurol. Clinic, Univ., Heidelberg.]

This note deals with the toxic and therapeutic value of a new organic thiogold compound of the following formula :—



„Sulfo-Harnstoff“

Dinatriumsalz des 4,4'-Bis-

(2-auomerkaptobenzol-1-sulfosäure)-harnstoffs

Its therapeutic action was tested on mice infected respectively with *Trep. recurrentis* and *T. brucei*. The therapeutic index for the spirochaete infection was found to be 1 : 16 and that for the trypanosome infection 1 : 2.

W. Y.

- i. LEVINSON (L. B.) & ROMANOWA (K. G.). Arzneimittel und ultraviolette Strahlen. V. Mitteilung. Zur Analyse der kombinierten Wirkung des Novarsolans und ultravioletten Strahlen auf Trypanosomen. [**Analysis of the Combined Action of Novarsolan and Ultraviolet Rays on Trypanosomes.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 66. No. 1/2. pp. 141–148.
- ii. ROSKIN (Gr.), BICHOWSKAJA (A.) & SCHISCHLIAIEWA (S.). VI. Mitteilung. Die kombinierte Wirkung der ultravioletten Strahlen und einer Reihe von trypanoziden Stoffen auf Trypanosomen. [**Combined Action of Ultraviolet Rays and a Series of Trypanocidal Substances on Trypanosomes.**]—*Ibid.* Vol. 67. No. 1/2. pp. 91–94. [2 refs.]
- iii. — & ROMANOWA (K.). VII. Beitrag zur Analyse der kombinierten Wirkung von Salvarsan und ultravioletten Strahlen bei Protozoeninfektionen. [**Analysis of the Combined Action of Salvarsan and Ultraviolet Rays in Protozoal Infections.**]—*Ibid.* pp. 94–101. [Microbiol. Research Inst., Education Commissariat R.S.F.S.R. Moscow.]

i. Reference is made to the previous work of ROSKIN and Romanowa and of ROSKIN and Levinson [*ante*, p. 233] that the therapeutic action of salvarsan is increased by subjecting the animal to the influence of ultraviolet rays. The authors have now enquired whether, in order to produce this increased action, it is necessary to apply the rays after the administration of the drug to the infected animal, or whether the application of the rays before the administration of the drug also leads to an increased action of the latter. The conclusions are:—

1. The application of ultraviolet rays to an animal infected with *T. equiperdum* or *T. gambiense* exerts no influence on the infection.

2. The radiation of mice infected with *T. equiperdum* before treatment with novarsolan increases neither the therapeutic nor the sterilizing action of the drug.

ii. In further experiments the authors used, instead of salvarsan, germanin and tartar emetic. They obtained with these drugs negative results and conclude that the phenomenon which is only seen with salvarsan is due to an action of the ultraviolet rays on this drug in the animal body.

iii. It was found that the serum of mice which had been subjected to ultraviolet rays possessed, when mixed with subcurative doses of neosalvarsan, the capacity of so altering the drug as to render the doses curative. The serum of the exposed mice alone exerted no influence on the course of the trypanosome infection.

W. Y.

GIEMSA (G.) & ELLENBOGEN (V.). Die kombinierte Wirkung ultravioletter Strahlen und Neosalvarsan auf *Trypanosoma equiperdum*. [**Combined Action of Ultra-Violet Rays and Neosalvarsan on *T. equiperdum*.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 67. No. 1/2. pp. 78–82. [Inst. for Ship & Trop. Diseases, Hamburg.]

The authors were unable to confirm the statement recently made by ROSKIN and ROMANOWA [*ante*, p. 233] that the application of ultraviolet rays to an infected mouse greatly increased the therapeutic activity of small doses of neosalvarsan.

W. Y.

CHAGAS. Sur les altérations du coeur dans la trypanosomiase américaine (maladie de Chagas). [**Cardiac Changes in American Trypanosomiasis.**]—*Arch. Malad. du Coeur.* 1928. Vol. 21. pp. 641–655. With 8 text figs. & 12 plates following p. 704.

The author describes the cardiac lesions he has met with in the acute and chronic stages of the disease which bears his name. In the acute stage there is an intense and diffuse myocarditis with mechanical and toxic destruction of the fibres and an abundant infiltration of the

interstitial tissue ; macroscopically there is a moderate dilatation of the cavities and a diminution of consistency. In the chronic stage the myocarditis is especially interstitial : there is a hyperplasia of fibrous tissue and cellular infiltration. Sometimes the fibrosis and infiltration are found in the same focus, but zones showing exclusively hyperplasia and others only infiltration are not uncommonly met with. This specific myocarditis is specially characterized by its extension throughout the entire myocardium. No lesions are to be found in the valves or coronary vessels. In the chronic stage there is always considerable increase in size of the heart, with dilatation of the cavities, but only slight hypertrophy of the walls.

The author next passes to a description of the clinical signs produced by these lesions.

Symptoms, subjective and objective.—In the acute stage of the disease the cardiac alterations are ill-defined and indicated solely by enfeeblement of the organ, without the marked alterations of rhythm characteristic of the next stage. In the chronic stage the symptoms are dependent on the intensity of the inflammatory processes. To begin with signs of circulatory insufficiency are absent, but physical examination reveals functional changes in the heart. As the disease advances the cardiac symptoms become more marked : the patient becomes fatigued, there is intense dyspnoea on effort ; vertigos and palpitations are frequent and these are accompanied by vague precordial pains. The following are among the more salient physical signs—enlargement of the heart, discrete oedemas, greatly reduced arterial tension and arrhythmia.

Alterations of the cardiac rhythm.—This in its various forms constitutes the outstanding symptom of the disease. The types of arrhythmia are to be correlated with the functional alterations.

The author discusses these various conditions and illustrates his observations by electrocardiograms.

Evolution of the cardiac form—This depends on the intensity and extension of the inflammatory process, and also upon the site of the lesions, e.g., whether these are in regions of greater or less functional importance. There is reason to believe that the lesions develop more rapidly in the ventricles because it is there that one encounters the initial alterations of rhythm. The morbid processes seem to be later in the auricles and to develop more slowly.

Death in American trypanosomiasis. Death may supervene from progressive asystole, or suddenly. The former undoubtedly occurs more frequently, but the latter event is very interesting. In regions where trypanosomiasis is endemic it is rarely that patients when questioned do not mention cases of sudden death in their family history. The paper ends with a discussion of various hypotheses which have been advanced to explain the mechanism of sudden death in this disease.

W. Y.

CHAGAS (Evandro). Estudo electro-cardiographico na forma cardiaca da trypanosomiase americana. [**Electrocardiogram Study in the Cardiac Form of American Trypanosomiasis.**]—*Folha Med.* 1930. Mar. 25. Vol. 11. No. 9. pp. 97–99. With 11 text figs. [Oswaldo Cruz Hosp., Rio de Janeiro.]

This is a most interesting study of the cardiac irregularities occurring in 35 cases of Chagas's disease. The commonest were disturbances of

ventricular rhythm (in 34), extrasystoles and auricular disturbance next (31 each), dissociation of auriculo-ventricular cycle (11); less common is sinus arrhythmia, and auricular fibrillation was observed once only. These symptoms are due to localization of the parasite in the musculature of the heart, either interfering with conductivity or increasing excitability. The mortality is very high; sudden death occurred in twenty-seven and was most likely to take place in those with ventricular arrhythmia and extrasystole, not in those with heart-block. [The reproductions of the cardiographic tracings are unfortunately too hazy and too much reduced to convey much information.]

H. H. S.

CHAGAS (Evandro). Estudo electro-cardiographico na fórma cardiaca da trypanosomíase americana. [**Electrocardiographic Study of Cardiac Forms of American Trypanosomiasis.**]—*Folha Med.* 1930. Apr. 5. Vol. 11. No. 10. pp. 113–115. With 8 text figs. [Oswaldo Cruz Hosp., Rio de Janeiro.]

Further notes on the conditions of arrhythmia occurring in Chagas's disease are given, in particular the ventricular forms, with cardiographic tracings.

H. H. S.

REGENDANZ (P.). Der Verlauf der Infektion mit *Schizotrypanum cruzi* (Chagas) bei jungen Ratten und ueber die Unempfindlichkeit erwachsener Ratten für *Schizotrypanum*. [**The Course of *T. cruzi* Infection in Young Rats and the Insusceptibility of Adult Rats to this Infection.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Apr. 26. Vol. 116. No. 4/5. pp. 256–264. [4 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Experiments showed that whilst adult rats are insusceptible to *T. cruzi*, young animals are readily infected during the first weeks of life. An account is given of the course of the infection in young rats; the incubation period is 7 to 13 days. The younger the animal the heavier, as a rule, is the blood infection and the longer its duration.

From the seventh to the eighth week onwards parasites can no longer be found in the blood, no matter at what age the rat was infected or what was the original degree of infection. The infection ends fatally in 25 per cent. of young rats, or the parasites may disappear from the blood and apparently the infection dies out.

The course of the infection in rats corresponds closely with the acute form of Chagas's disease; and similarly the insusceptibility of adult animal corresponds with that of older children and adult human beings.

The serum of adult rats has no protective action. Neither the castration of adult rats nor the implantation of the testes of adult rats into young rats or mice exerts any influence on the susceptibility to infection. Similarly splenectomy of adult rats does not make them susceptible.

W. Y

MAZZA (Salvador). Acerca de la infección espontánea de la mulita en el norte por el "*Tripanosoma cruzi*." (Nota preliminar.) [**Spontaneous Infection of the Armadillo in the Northern Argentine by *Trypanosoma cruzi*.**]—*Prensa Méd. Argentina.* 1930. Jan. 30. Vol. 16. No. 24. pp. 1171–1173. With 1 text fig. [6 refs.]

In spite of the large number of human cases of infection by *T. cruzi* no animal reservoir host has been discovered. The author found a certain species of armadillo, *Dasypus hybridus*, of which several are present in the Northern Argentine (*D. novemcinctus*, *D. velerosus* and *D. hybridus*), to be harbouring the trypanosomes. Four years ago he found a dog naturally

infected. Attempts to make *Triatoma infestans* bite *D. hybridus* have failed, but another species, *T. geniculata*, has been found to transmit the infection from one of these animals to another, according to observations made in Brazil.

H. H. S.

MAZZA (Salvador). Acerca de la infección espontánea de la mulita por el "*Trypanosoma cruzi*" en el Norte Argentino. Comprobación en el miocardio y pulmón de los "Gigantocitos quísticos" de Magarinos Torres. (Segunda nota preliminar.) [*T. cruzi* in Armadillo. **Cystic Gigantocysts of Torres in Myocardium and Lung.**—*Prensa Méd. Argentina*. 1930. June 10. Vol. 17. No. 1. pp. 49-54. With 11 text figs. [5 refs.]

In December, 1929, the author found an armadillo (*Dasypus hybridus*), one of 80 such animals examined, spontaneously infected with *T. cruzi*. At the time of capture 3 or 4 trypanosomes were seen in each field of a blood smear; the number increased for 5 days, after which they diminished and 10 days later none was found. *Acanthocheilonea tatusi*, adult and embryos, were present in the same animal, which was killed on January 2nd, 1930, and the tissues were sectioned. The trypanosomes, though absent from the general circulation, were seen in the myocardium, one lung and the thigh muscles, not elsewhere. "Cystic gigantocytes" which had been recorded by TORRES in a *Dasypus novemcinctus* spontaneously infected were looked for and found in the heart and the muscle fibres of the bronchi. These are large cells, up to 80 microns long by 15-16 wide, containing many leishmanial forms arranged around the nucleus, which has a ring shape and within it is a clear space containing no parasites. Seeing that parasites had disappeared from the circulating blood, and inoculation may also fail, it is not possible to declare an animal uninfected without microscopical examination of the tissues.

H. H. S.

GIORDANO (Mario). Sulla possibilità di infettare il *Triatoma flavida* con il *Trypanosoma cruzi*. [*Triatoma flavida* as a Possible Vector of *Trypanosoma cruzi*.]—*Arch. Ital. Sci. Med. Colon.* 1930. Apr. 1. Vol. 11. No. 4. pp. 193-195. With 2 text figs. English summary (5 lines). [Inst. of Trop. Path., Univ., Bologna.]

In addition to the known reduviid bugs which transmit *T. cruzi* in nature, there are several which can be experimentally infected; seven are specifically mentioned. *Triatoma flavida* is found in Cuba, but Chagas's disease is not seen. Eggs were sent by Professor HOFFMANN from Habana to the author, who without difficulty was able to infect the bugs with *T. cruzi* and in their development proceeded as in *T. megista* or *Rhodnius prolixus*. Should the disease be introduced from America to Cuba, as is not unlikely, *Triatoma flavida* being present furnishes conditions favourable to its spread.

H. H. S.

- i. CAMPOS (Ernesto de Souza). Alterações pathologicas do tecido adiposo na molestia de Chagas congenita experimental. [**Pathological Changes in the Adipose Tissue in Congenital Trypanosomiasis of the Dog. Experimental Chagas' Disease.**—*Bol. Biol.* 1929. Dec. 20. No. 16. pp. 75-77. With 3 figs. [3 refs.] [In Portuguese. English summary.]
- ii. —. Corpos intranucleares nas cellulas do reticulo endotelial do ganglio lymphatico parasitado pelo *Trypanosoma cruzi*. Nota previa. [**Intranuclear Bodies in Experimental Trypanosomiasis of Dogs (Chagas' Disease).**—*Ibid.* pp. 99-100. With 2 figs. [In Portuguese. English summary.] [Microbiol. Lab., Faculty of Med., S. Paulo.]

i. In a case of congenital trypanosomiasis (*T. cruzi*) of a two months old puppy, the author observed pathological changes in the fat areolar tissue

around the kidney and especially suprarenal bodies. Numerous parasites were found in the loose connective tissue and inside the fat cells. The small amount of cytoplasm constituting the wall of these cells was filled with the parasites. The loose connective tissue exhibited a marked myeloid formation. There were also numerous lesions associated with the presence of parasites in the other tissues of this puppy, i.e., brain, spinal cord, lymph glands, kidneys, adrenals, and so forth.

ii. It was observed that in the swollen lymph nodes of puppies infected with *T. cruzi* there was a proliferation of the reticulo-endothelium, some of the cells of which contained numerous parasites. The nuclei of these cells exhibited characteristic changes which are similar to those caused by filterable viruses. Round, oval, or even slightly irregular masses staining very well by different methods are seen in the central part of the nucleus. The nucleus becomes vesicular in character, so that there is a definite space between the central body and the limiting membrane, which is stained deeply with basic dyes. Usually the inner surface of the membrane is irregular as though the basic staining material were collected there. The central body stains deeply.

W. Y.

GALLIARD (H.). Infections à *Trypanosoma cruzi* chez les animaux splénectomisés. [*T. cruzi* Infections in Despleated Animals.]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 188–192. [17 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The author found that neither inoculation of *T. cruzi* into splenectomized animals nor the removal of the spleen during infection exercised any influence on the evolution of the disease.

W. Y.

GALLIARD (H.). Localisation péritonéale exclusive au cours de certaines infections à *Trypanosoma cruzi* chez la souris. [*Peritoneal Localization of T. cruzi* in Mice.]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 140–142. [1 ref.] [Parasit. Lab., Faculty of Med., Paris.]

The author refers to his previous paper [*ante*, p. 246] in which he pointed out the occurrence of an early and constant localization of parasites in the peritoneal cavity of mice infected with *T. cruzi*. He now records further observations on this subject. He writes that in the course of the development of certain *T. cruzi* infections in the mouse, the occurrence of parasites in the blood is always scanty and irregular, and sometimes non-existent, even in the terminal period. On the contrary, the peritoneal localization is constant, progressively increasing and finally causing death. Oedema of the thoracic and abdominal walls and the presence of trypanosomes in the subcutaneous fluid are more constant than was previously thought. The peritoneal infection disappears only in exceptional circumstances, which will be indicated later. It is sometimes retarded when there is contamination at the time of inoculation. The subcutaneous route is preferable in view of the precocity and intensity of the infestations which it produces.

W. Y.

LWOFF (Marguerite). Millieu d'isolement et d'entretien pour *Schizotrypanum cruzi* Chagas. [*Cultivation Medium for T. cruzi*.]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 909–912. [6 refs.]

After referring briefly to the various methods which have been devised for the cultivation of *T. cruzi*, the author describes one which he has used with great success in the cultivation of various *Leptomonas* forms. The medium is a simple fluid one consisting of a solution of proteins, but

slightly broken down and rich in polypeptones—Chapoteaut's peptone or "peptone pepsique" made from ox muscle according to Vaillant. The medium is inoculated with a few drops of infected blood and the culture kept at 18° C. to 22° C. The flagellates are present in numbers in from 10 to 15 days, and the culture flourishes up to the 45th day and then declines but continues even to the 60th day or further. Subcultures were made successfully about every 25th day.

W. Y.

Dios (R.), WERNGREN (E. T.) & PEREZ (P.). Sensibilité du crapaud à l'infection expérimentale par *Trypanosoma cruzi*. [**Susceptibility of the Toad to Experimental Infection with *T. cruzi*.**]—*C.R. Soc. Biol.* 1929. Vol. 102. No. 36. pp. 1100–1101. [1 ref.]

Attempts to infect batrachians and reptiles with the pathogenic trypanosomes of mammals have proved unsuccessful, but NINO (1925) claims to have infected toads with *T. cruzi*. The authors have re-examined the question of the infectibility of toads by *T. cruzi*, and for the purpose have employed 64 toads common in the neighbourhood of Buenos Aires. The sources of the virus used were: (1) flagellates from the intestine of various naturally infected *Triatoma*; (2) the blood of infected children; and (3) the blood of mice infected from *Triatoma*. Examinations were made of the blood and organs of the inoculated toads, and subinoculations were made into white mice. The results were absolutely negative. The authors consider that an explanation of NINO's results is that the animals were previously infected with trypanosomes specific to them or by haemogregarines.

W. Y.

SICÉ (A.). Recherches sur le pouvoir flocculant du sérum des trypanosomés. [**The Flocculating Property of the Serum in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 912–916. [4 refs.]; and 1930. May 14. Vol. 23. No. 5. pp. 459–460. [1 ref.] [Pasteur Inst., Brazzaville]

The object of the work described in these papers was to ascertain whether the serum of sleeping sickness patients precipitated alcoholic extracts of the organs of infected guineapigs or other animals. As the result of preliminary observations the author concentrated on alcoholic extracts of the heart muscle of sheep and goats infected with *T. congolense-dimorphon* or nagana. The extract is made as follows:—

100 gm. of minced heart muscle is allowed to macerate in 125 cc. of 95 per cent. alcohol for 7 days at 20° C. Filter and drain the residue; this is then spread on a glass plate and allowed to dry for 24 hours at 37° C., after which it is placed in 200 cc. of acetone and allowed to stand for 8 days at a temperature of over 20° C. Filter, drain and rinse the fragments and place them in a little more acetone for 24 hours in order to ensure the removal of all acetone soluble material. Filter, drain and dry the residue at 37° C. for 4 hours. The dried residue is then weighed and allowed to macerate in a closed flask with absolute alcohol—100 cc. of alcohol for each 15 gm. of dried residue. The maceration is continued for 12 days at over 20° C., the flask being shaken each day. Filter: the fluid which passes through represents the alcoholic extract of the acetone residue. It should be preserved in a sealed bottle.

As diluting fluid the author has tried various concentrations of sodium chloride in distilled water and finally has decided on 3.5 per cent., which gives undoubtedly the best results. The serum of the patient must be perfectly clear—containing neither haemoglobin nor bile pigments—and must be freshly obtained, and not heated.

The test is conducted as follows : Into one tube is dropped from a pipette 1 cc. of the alcoholic extract of acetone residue of the heart, and into another 15 cc. of the 3.5 per cent. NaCl solution. The two tubes are left in the water bath at 40° C. for 10 minutes, and then the contents of the second tube is poured into the first and that of the first into the second and so on until the two solutions are completely mixed and a perfectly homogeneous, very slightly opalescent fluid is obtained. This is left in the water bath at 40° C. for 10 minutes and then 1 cc. of it is added to each of the tubes containing 0.1 cc. of the various sera to be examined. The mixture is shaken and then allowed to stand.

With the object of hastening the reaction, the author investigated the various essences at his disposal and found that essence of cloves diluted with 50 times its volume of absolute alcohol when added to the heart extract greatly increased the rapidity of the reaction. With this modification 1 cc. of alcoholic extract of muscle is added to 1 cc. of the 1/50 solution of essence of cloves in the first tube and the 15 cc. of the 3.5 per cent. sodium chloride solution in the second. The mixture is then made as before.

The author states that he has studied the reaction with more than 1,300 sera. The sera of uninfected persons gives no reaction, the contents of the tubes remaining perfectly clear. But the sera of infected persons produces within a few moments a definite turbidity ; later flakes appear, varying in size and number and gradually fall to the bottom of the tubes. The reaction is complete within 12 hours.

Two exceptions were noticed. The first was seen in certain very early cases ; the second was more troublesome and seen in certain very advanced cases. In these latter cases the mixture did not remain perfectly clear, but there was no definite development of flakes. It is remarked that under the influence of prolonged treatment the reaction tends to disappear from the serum of many patients. Apart from these exceptions the flocculating power was always noted in the serum of trypanosomiasis cases, both European and native. It was not found in the sera of cases of syphilis, yaws, leprosy, tuberculosis, malaria and in 80 per cent. of relapsing fever cases.

In his second paper the author records that the serum of syphilitics sometimes gives a faint reaction, but rarely a reaction comparable to the complete flocculation obtained with the sera of cases of trypanosomiasis.

W. Y.

LE GAC (P.). La réaction de Targowla dans la trypanosomiase humaine. [**Targowla's Reaction in Human Trypanosomiasis.**].—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 530-532.

The author has tested the Targowla reaction in cases of human trypanosomiasis.

The reagents required are : (1) recently distilled water ; and (2) pure elixir of paregoric prepared according to the Codex. The apparatus necessary consists of two haemolysis tubes and two dropping pipettes of the same calibre, i.e., delivering 53 drops of paregoric per cc. The glass-ware must be thoroughly cleaned with 2 per cent. HCl and then carefully rinsed with distilled water and dried.

The test is performed as follows : Into one haemolysis tube add successively 5 drops of distilled water, 15 drops of cerebrospinal fluid, and 5 drops of elixir of paregoric ; shake well to obtain a homogeneous mixture.

Into the second haemolysis tube (control tube) are placed 5 drops of distilled water and 5 drops of elixir of paregoric. The tubes are left at laboratory temperature and the result read after 12 to 24 hours.

+++	indicates	total precipitation.	
++	"	partial	"
+	"	slight	"
—	"	no	" (negative reaction).

The test was examined in 9 cases of sleeping sickness—4 at the commencement of the second stage, 3 definitely in the second stage, and 2 in the third stage.

Of the 4 cases in the first category, 2 gave a +++ reaction, 1 a + reaction, and 1 a negative reaction. All the cases in the second and third categories gave a +++ reaction.

W. Y.

REGENDANZ (P.) & JURUKOFF (B.). Ueber das Adhäsionsphänomen der Trypanosomen. (Agglomeration, Blutplättchenbeladung, Leukozyten-Attachement.) [**The Adhesion Phenomenon of Trypanosomes. (Agglomeration, Platelet-Loading, Leucocyte Attachment.)**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 66. No. 1/2. pp. 32–44. [15 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The following summary is given :—

The process known as agglomeration of trypanosomes is comparable with the platelet-loading and leucocyte-attachment phenomenon.

These three clumping phenomena are identical in nature and in cause. They are due to a secretion of tektin by the trypanosomes as a result of the action of immune sera on them.

The platelet-loading phenomenon can also be produced by the action of non-specific sera.

No definite facts can be obtained indicating the presence of different antibodies in the immune serum which can produce one or other of the phenomena.

The appearance of agglomeration or of platelet-loading is much more dependent on the number of the trypanosomes and that of leucocyte-attachment on the number of leucocytes.

The results of investigations on the appearance of agglomeration and platelet-loading are given. The phenomena were always produced by the corresponding immune sera with the original strain in the mouse and with the relapse strain which results from the formation of immune serum in the blood.

The platelet-loading phenomenon is, like the agglomeration phenomenon, of only limited value for the specific differentiation of trypanosomes; its appearance is in general in favour of specific identity; its failure, however, merely indicates the non-existence of strain identity and does not exclude specific identity.

It is proposed to gather together the three clumping phenomena—agglomeration, platelet-loading, and leucocyte attachment—under the name "adhesion phenomenon."

W. Y.

LLOYD (Ll.) & PAISLEY (J. C.). **Note on an Attempt to estimate the Number of Trypanosomes injected by an Infective Tsetse.**—*West African Med. Jl.* Lagos. 1929. Oct. Vol. 3. No. 2. pp. 31–32. [2 refs.]

This paper records an attempt to estimate by direct counts in the tsetse fly the number of trypanosomes which may be injected in the

act of feeding. With *T. brucei* the attempt was unsuccessful. Infective flies were induced to feed through a membrane from a small quantity of serum, and the fluid remaining was examined for the injected forms of the trypanosome. Although these were found, they were present in such small numbers that an estimate could not be made. With *T. congolense* and *T. vivax* it is possible to count the trypanosomes in the hypopharynx, which is the site of the infective forms. This was done in a series of freshly caught flies and also in a series which had been fed a few minutes previously. It was thought that the difference in the averages might give an approximate idea of the number injected. With *T. vivax* in *G. morsitans* the average number of hypopharynx forms was 158 (max. 1,000, min. 1) in 50 infected flies; directly after feeding it was 93 (max. 609, min. 0) in 46 infected flies. From these figures it is calculated that the number of trypanosomes injected was probably in the neighbourhood of 60. With *T. vivax* in freshly caught *G. tachinoides* the average was 145 (max. 467, min. 4).

With *T. congolense* in 9 infected *G. morsitans* the average number of trypanosomes in the hypopharynx was 268 (max. 604, min. 15); in 9 *G. morsitans* directly after feeding, the average was 256 (max. 1,000, min. 0). This gives for the small number counted an average of 12 infected forms injected. The authors write that one would have expected that the flow of salivary secretion down the hypopharynx during feeding would have dislodged all the trypanosomes therein. Often this flow must be greatly impeded by the trypanosomes, and may be almost prevented, as in the case of a *T. congolense* infection which was so massive that directly after feeding there were three plugs of trypanosomes in the hypopharynx; yet the fly gorged itself. LESTER and LLOYD (1928) have previously shown that injection of salivary secretion into the hosts is not a necessary preliminary to feeding and that a fly deprived of its salivary gland may live and feed for as long as two months. Blocking of the hypopharynx by trypanosomes is consequently not an immediate disaster to the fly, and it would appear that relatively seldom is a massive infection dislodged from the hypopharynx when the fly is feeding.

Reference is made to the "preinfective" forms described by LLOYD and JOHNSON (1924) in the case of *T. vivax* and *T. congolense*. This form passes from the labial cavity to the hypopharynx and there, by transition, becomes the infective form. If a heavily infected hypopharynx is isolated in a minute drop of saline and carefully broken up this form may be found in considerable numbers, and the authors have one such preparation in which the preinfective forms are actually more numerous than the infective. The fact that all the hypopharyngeal forms are not dislodged by the flow of saliva when the fly feeds suggests that these preinfective forms are attached to the wall of the hypopharynx and when very numerous can actually prevent the saliva flowing until they are mature and, presumably, free.

The authors believe that this work throws light on the fact that a considerable number of flies in which the rate of infection by *T. vivax* and *T. congolense* is found to be high by microscopic examination of a sample may be fed on a susceptible animal, which subsequently may develop only one species of trypanosome or neither. It is inferred from this work that a tsetse seldom injects a dose of more than 1,000 infective forms of *T. vivax* or *T. congolense*.

W. Y.

LLOYD (LI.). **Some Factors influencing the Trypanosome Infection Rate in Tsetse Flies.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 533-542. With 1 text fig. [8 refs.]

This paper records a study of the transmissibility of two strains of *T. brucei* which had been maintained for a considerable period in laboratory animals. *T. brucei* Strain C was isolated from wild *G. morsitans* on March 13th, 1928, and at the beginning of the experiments was 377 days old and had passed through 1 dog, 28 rats, and 4 guineapigs. Its virulence for rats in the early stages is unknown, but in April and May, 1929, the average duration of the infection in 18 white rats was only 6 days.

T. brucei Strain D was isolated from *G. morsitans* on October 8th, 1928, and at the commencement of the experiments was 135 days old, and it passed through 1 rat, 2 monkeys, and 14 dogs. In April and May, 1929, the average duration of the infection in 11 rats was 17 days; it was thus less virulent than Strain C. The transmission experiments were conducted with laboratory-bred *tachinoides*. The results of the experiments are set forth in tables and the following summary is given:—

"Transmissions by *G. tachinoides* of two old laboratory strains of *T. brucei* separately, and of the two strains mixed in the fly have been carried out. When the strains were mixed, the rate of infection in the flies in the combined experiments was much greater than was obtained with either strain alone. The variation in the rate of infection in the individual groups makes it uncertain whether this higher rate was due to the mixing of the two strains. These experiments, however, are well worth repeating, since, if two old strains can rejuvenate one another, this will have an important bearing on the epidemiology of the diseases.

"The virulence to white rats of the strain produced by the mixing was greater than is usual with a newly isolated strain of *T. brucei*, equal to that of a strain 400 days old, and distinctly less than that of a strain 200 days old.

"The factors which influence the rate of infection in tsetse by trypanosomes are so many that it is impossible to estimate with any degree of accuracy the transmissibility of any particular strain.

"An unusual form of division in the gut flagellates was noted."

W. Y.

DUKE (H. Lyndhurst). **Factors influencing Trypanosome Infection Rate in Tsetse Flies.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. June 30. Vol. 24. No. 1. pp. 125-127.

In this letter Duke replies to certain statements made by LLOYD [see above]. Duke states that when he wrote the Commission's Report he held the view "that every time the appropriate form of the trypanosome was taken up by a tsetse, infection of the fly resulted." He did not intend to imply that Miss ROBERTSON took this extreme view; indeed she makes it clear that, in her opinion, different strains differ in their infectivity to tsetse. As a matter of fact, the work of the last two years has led Duke himself to modify this view. He objects to LLOYD's statement, "Considering the vast numbers of trypanosomes that the fly takes up in an infecting meal, which must include many individuals of any form which may be

demonstrable by the microscope, then the infection rates in a group of flies should be either nothing or 100 per cent." Duke states that he has never maintained that the forms that differ in the flies are demonstrable by the microscope; in fact, experience has shown that they are not. The few strains at Entebbe, which have been sufficiently tested to warrant the description "non-transmissible," remain polymorphic and show forms indistinguishable morphologically from those of their transmissible fellows.

Duke states that in the course of time he has produced evidence that a strain transmissible when first isolated, and for some time afterwards, may, in the course of prolonged upkeep by syringed passage, reach a stage where it can still infect the gut of a fly, but can no longer develop in the glands; later on, this gut-infecting power may also disappear. Figures are quoted from previously published work to support this contention. Duke considers LLOYD's conclusion "that it is impossible to estimate with any degree of accuracy the transmissibility of any particular strain" to be a little premature.

W. Y.

DUKE (H. Lyndhurst). **On the Susceptibility of the Two Sexes of *G. palpalis* to Infection with *T. gambiense* and *T. rhodesiense*.**—*Ann. Trop. Med. & Parasit.* 1930. Apr. 7. Vol. 24. No. 1. pp. 95-96. [2 refs.]

Experimental records of the transmission experiments carried out at the Entebbe laboratory during the three years August, 1926, to July, 1929, have been examined to see whether they afford any indication of a difference in susceptibility of infection between male and female *G. palpalis*. For the purpose of this review all experiments which contained at least one infected fly were selected; negative experiments were ignored. The total number of laboratory-bred *G. palpalis* considered was 24,509, of which 12,737 were males and 11,772 were females. Of this total 1,237 (5 per cent.) contained developmental forms of either *T. gambiense* or *T. rhodesiense*. Of the infected flies 581 were males and 656 females, i.e., 4.5 and 5.5 per cent. respectively. Further examination showed that of the 12,737 males exposed to infection 178 (1.3 per cent.) had flagellates in the salivary glands; and of the 11,772 females 183 (1.5 per cent.) were similarly infected; i.e., of the positive males 30.6 per cent. showed gland infections and of the positive females 27.8 per cent. The author considers that the above percentages have no general value as an indication of the susceptibility of *G. palpalis* to infection with *T. gambiense* and *T. rhodesiense*, but that they are merely useful for the purpose for which he has employed them, i.e., the comparison of the behaviour of the two sexes under identical conditions.

W. Y.

MACLEAN (George). **Stumpy and Posterior-Nuclear Forms in a Strain (Ferox) of *Trypanosoma brucei*.**—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 519-520. [6 refs.] [Path. Dept., Univ., & Western Infirmary, Glasgow.]

In this note the author records that he observed on several occasions stumpy forms in a "ferox" strain of *T. brucei* received from MESNIL in a

guineapig 16 months previously, and since kept in mice in the Pathological Department of Glasgow University. Among these stumpy forms were six individuals showing various degrees of posterior-nuclear development; one being a typical poste-riornuclear form.

W. Y.

AMAKO (T. H.). Beiträge zur Kenntniss der Schutzkraft der Milz und des Retikuloendothelial-Systems gegen eine Infektion des Organismus durch *Spirochaeta duttoni* und *Trypanosoma gambiense*. [The Protective Power of the Spleen and Reticulo-Endothelium against Infection of the Organism by *Sp. duttoni* and *T. gambiense*.]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Apr. 26. Vol. 116. No. 4/5. pp. 280–284. [27 refs.] [Med. Faculty, Kyushu Imperial Univ., Fukuoka, Japan.]

A large series of mice was injected with a definite dose of *Sp. duttoni* at various intervals varying from the day after splenectomy until 14 days later. As controls normal animals, and those in which laparotomy alone had been performed, were used. The mortality rate of these different groups of animals is shown in a table. In the normal mice it was 5·8 per cent., in the laparotomy group 6·3 per cent., and in the splenectomized mice it varied from 85·6 per cent. in those injected the day after splenectomy to 20·4 per cent. amongst those injected 7 days later and 15·2 per cent. for those injected 14 days later.

Comparable results were obtained in the case of guineapigs infected with *T. gambiense* or *T. equiperdum*. It is concluded that splenectomy greatly decreases the resistance of the animals to infection with spirochaetes and trypanosomes; the protocols show that from the fourth day after splenectomy the resistance is gradually recovered.

Further experiments showed that partial splenectomy only slightly decreased the animal's resistance and that intraperitoneal implantation of spleen tissue in splenectomized animals partially compensated the effects of the latter process.

Blocking of the reticulo-endothelium by india ink or electrocollargol had a similar, but less pronounced, action to splenectomy, and simultaneous splenectomy and blocking exerted a very pronounced action.

W. Y.

NIESCHULZ (Otto) & WAWO-ROENTOE (F. K.). Ueber den Einfluss der Milzexstirpation bei Infektionen mit *Trypanosoma gambiense* und *Schizotrypanum cruzi*. [On the Influence of Spleen Extirpation on *T. gambiense* and *T. cruzi* Infections.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 3/4. pp. 312–317. [6 refs.] [Inst. for Infectious Diseases & Parasit., Reich Univ., Utrecht.]

After referring to the fact that KRITSCHESKI and SCHWARZMANN had found that splenectomy exercised no influence on the duration of *T. gambiense* infections in mice, whilst KIKUTH and REGENDANZ had found that in splenectomized rats the infection ran a quicker course than in normal animals, the authors record that in their own experiments on surra infections in dogs splenectomy exercised a very definite effect.

In the present work five dogs, three of which had been previously splenectomized, were infected with *T. gambiense*. The intervals between splenectomy and infection were respectively 13, 11 and 1 days. Daily examinations of the blood were made and the results recorded in a table from which it is seen that the infections in the splenectomized dogs were much more severe than in the control animals.

In a similar experiment conducted with *T. cruzi* there was apparently no difference between the course of the infection in the splenectomized and normal animals.

The following are the conclusions :—

1. In dogs the spleen exerts a definite influence on the course of *T. gambiense* infection. The remainder of the reticulo-endothelium plays no rôle in the defence mechanism.

2. In *T. cruzi* infections of dogs splenectomy is without effect.

W. Y.

AMAKO (T. H.). Ueber die Rolle der Milz und der Leber bei der Antikörperbildung bei experimenteller Trypanosomiasis. [**The Rôle of the Spleen and Liver in Antibody Formation in Experimental Trypanosomiasis.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. July 28. Vol. 117. No. 7/8. pp. 470–479. With 2 charts in text. [139 refs.]

The author has conducted investigations on the antibodies which appear in trypanosome immunity, especially on the place of formation of the agglomeratins. With this object in view, he has devoted particular attention to the rôle of the liver and spleen.

Mice were infected with such a dose of *T. gambiense* that they habitually died in 3 days. At the height of the infection they were bled into citrated saline and the parasites were then washed thrice in saline and finally suspended in a 0.3 per cent. solution of lecithin in normal saline. For the agglomeration investigation living trypanosomes were suspended in deactivated rabbit serum. The trypanosome vaccine was made in a formol-saline solution, consisting of physiological saline 9.5 cc. and formalin 20 per cent. solution 0.5 cc.; the suspension was immediately centrifuged and re-suspended to a standard concentration in physiological saline.

In the determination of the agglomeratins the author has combined the microscopic and macroscopic methods. Rabbits were immunized by injection of the lecithin solution vaccine.

The following summary is given :—

1. The spleen and liver are the chief site of the formation of agglomeratins; in the initial stages of immunization the formation of agglomeratins in the spleen and liver is especially active. In the course of time, after vaccination, however, change in the agglomeratin picture is no longer produced either by splenectomy or functional disturbance of the liver.

2. Transplantation of the spleen or liver of rabbits which were previously immunized can produce agglomeratins. The spleen is more active than the liver.

3. On direct injection of small amounts of vaccine into the spleen or liver the agglomeratin appeared in the peripheral blood more quickly and in greater degree than after intravenous immunization with similar doses of vaccine.

4. Examination of organ extracts of immunized rabbits showed that the greatest amount of agglomeratins were formed in the liver and spleen.

5. The spleen appeared to be of greater significance as a site of formation of agglomeratin than did the liver. The spleen and liver stand in relationship one to another: splenectomy is compensated by the liver, and destruction of the function of the liver by the spleen.

W. Y.

- i. HOEPLI (R.) & REGENDANZ (P.). Beiträge zur Pathogenese und Histopathologie der Trypanosomeninfektionen der Tiere. [**Pathogenesis and Histopathology of Trypanosome Infections of Animals.**] I. Ueber die Pathogenese der Gewebsveränderungen bei der Trypanosomeninfektion, die Einwanderung der Trypanosomen in das Gewebe, in die serösen Flüssigkeiten der Körperhöhlen und in das Konjunktivalsekret. [**Pathogeny of Tissue Changes in Trypanosome Infections; Penetration of Trypanosomes into the Tissues, Serous Fluids, and Conjunctival Secretion.**] [REGENDANZ.] II. Histologischer Teil. Gewebsveränderungen bei Trypanosomeninfektionen der Tiere. [**Tissue Changes in Trypanosome Infections.**] [HOEPLI.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Jan. & Feb. Vol. 34. Nos. 1 & 2. pp. 1-18; 67-99. With 11 text figs. [30 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]
- ii. REGENDANZ (P.). Ueber die Ansammlung von Trypanosomen in den Flüssigkeiten der Körperhöhlen und ihre Bedeutung für das Entstehen von Gewebsveränderungen. (Nach experimentellen Untersuchungen.) [**Accumulation of Trypanosomes in the Fluids of the Body Cavities and its Significance for the Genesis of Tissue Changes.**]—*Beihfte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 97-101 (181-185).

i. The first part of this paper, for which Regendanz is responsible, deals with the pathogenesis of the tissue changes in trypanosome infections, and the migration of the trypanosomes into the tissues, the serum fluids of the body cavities and the conjunctival secretion. In his experiments the author employed rats, hamsters, rabbits, cats, dogs and monkeys infected with *T. gambiense*, *T. rhodesiense*, *T. brucei* or *T. equiperdum*.

The following summary is given of this portion of the work :—

In trypanosome infections of various species of animals the occurrence of trypanosomes in the fluids of the body cavities (except the cerebrospinal fluid) was investigated and its connexion with the histopathological changes in the corresponding organs examined.

In the pericardial fluid trypanosomes were always found if pronounced pathological changes existed in the epi- and myo-cardium, and sometimes also in the absence of these.

In one animal numerous trypanosomes were found in the hydrocele fluid and in the cavities of the testes.

The trypanosomes may migrate from the serous fluids into the tissues of the organs and these give rise to histopathological changes.

In the aqueous humour trypanosomes—often in great number—were always found when pathological lesions of the eye (opacity of the lens, iridocyclitis, keratitis, conjunctivitis) were manifest.

The trypanosomes migrated out of the aqueous humour and tissue of the iris into the conjunctival tissue and secretion of the conjunctival sac.

Trypanosomes were also found in great numbers in the choroidal plexus outside the blood vessels. In the same way that they escape from the conjunctiva into the secretion of the conjunctival sac, so they can pass from the tissue of the choroidal plexus into the cerebrospinal fluid.

The escape of the trypanosomes from the small blood vessels is due to a toxic action of the parasites. Owing to the long continued action of a mildly irritating toxin there arises a feeble leucodiapedetic condition of the minute blood vessels which renders possible the migration of the trypanosomes into the tissues.

Clinical findings in cases of human trypanosomiasis render it possible that similar pathological processes will also be found to occur in sleeping sickness.

The second part, which is by Hoepli, deals with the histology of the tissue changes in trypanosomal infections of animals.

The following summary is given :—

The histopathological changes, which appeared in the course of trypanosomal infection in 37 animals (monkeys, dogs, cats, rabbits, guinea-pigs and hamsters), are described.

These are essentially entirely dependent on the duration of the infection and not on the species of trypanosome. The species of the animal host played a part in so far as inflammatory changes of the myocardium, which are relatively pronounced in monkeys, were never found in dogs or cats.

The most noteworthy histological changes which occur in trypanosomal infections are myocarditis and pericarditis with deposition of numerous trypanosomes in the inflammatory foci; and furthermore, degeneration of the lens, iridocyclitis, and conjunctivitis, with the migration of trypanosomes into the subconjunctival tissue and into the tissue of the corpus ciliare and of the iris.

In the spleen and lymph nodes there occurs in the course of the infection a gradual replacement of the lymphocytes by plasma cells and finally by numerous macrophages.

In the brain one finds, in infections which are quickly fatal, as a rule only a degeneration of the ganglion cells.

The liver and lungs show numerous macrophages; in the liver a moderate degree of parenchymatous degeneration was found only four times, and the same number of times small necroses in the lungs were seen.

In the kidneys the epithelium of the renal tubules was frequently damaged, but the glomeruli were in the majority of cases unchanged.

The predominate cells in the inflammatory changes of the various organs were small round cells and macrophages, with scanty plasma cells and polymorphonuclear leucocytes. Cellular infiltration was found in the cardiac muscle, in the eyes, in the periportal tissue of the liver, in the meninges, in the choroidal plexus of the lateral ventricles, in interstitial tissue of the testes and the kidneys, in the striped muscle, and in the corium.

In sections trypanosomes were seen within the blood vessels of practically all the organs and more than once outside the blood vessels in the tissues.

ii. A general account of these observations and experiments with appropriate comment.

W. Y.

HARTMANN (E.). Rezidivstambbildung und Schankerimmunität bei der Trypanosomiasis des Kaninchens. [**Relapse Strain Formation and Chancre Immunity in Trypanosomiasis of Rabbits.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 1/2. pp. 53–60. With 1 text fig. [Skin Clinic, Univ., Münster.]

After referring in some detail to the work of STÜHMER (1916), the author passes to an experimental enquiry whether chancre immunity occurs in superinfection with trypanosome strains which are relapse variants of the original strain. He used in his work nagana (Prowazek). As STÜHMER has shown, if rabbits are inoculated intravenously or subcutaneously with trypanosomes the parasites appear in the blood in 3 or 4 days—on subcutaneous inoculation coincidentally with the development of a primary lesion. These parasites, which agree with the primary strain, disappear from the blood in a few days. After a latent period trypanosomes again appear in the blood; these, which are resistant to the by now highly developed immune bodies, are the relapse strains. If this relapse strain R_1 be injected into a second rabbit, a second relapse strain R_2 can be obtained, and if this be injected into a third rabbit a third relapse strain R_3 and so on. Having obtained in this manner a third relapse strain R_3 , the author performed two groups of experiments: In Group I rabbits were infected in the

right scrotum with the original strain A and superinfected elsewhere (eye or left scrotum) with relapse strain R₃ and the original strain A ; and in Group 2 rabbits were infected in the right scrotum with the relapse strain R₃ and superinfected with the original strain A and the relapse strain R₃. Nine such experiments showed clearly that the relapse strain and original strains behaved as heterologous strains, infection with one preventing chancre formation on superinfection with the same strain, but not with the other.

W. Y.

FISCHL (Viktor) & KUSSAT (Emmy). Atypische Naganainfektion bei Ratten. [**Atypical Nagana Infection in Rats.**]—*Klin. Woch.* 1930. June 21. Vol. 9. No. 25. pp. 1175–1176. [9 refs.]

The experiments described were conducted with two strains of nagana (Prowazek) which in the ordinary way killed rats in a few days. It was found, however, that on subcutaneous, intracutaneous or intravenous injection of healthy rats with small quantities (·05 to 1 cc.) of a suspension of trypanosomes, which had been centrifuged for three minutes, in the trypanosome-containing mouse serum or blood, or in physiological saline or rabbit serum (the suspension containing 1 parasite to a microscope field) atypical infections were produced in 10 to 30 per cent. of cases. As is shown in a table these infections were of three kinds :—

(a) The trypanosomes are found in varying numbers in the peripheral blood or persist until the death of the animal.

(b) The trypanosomes appear in the tail-blood just as do the spirochaetes of relapsing fever, sometimes being found and at other times being absent. Later subinoculation of the blood or organ extracts may reveal either a latent infection or spontaneous cure.

(c) The trypanosomes appear only once, for one or more days, in the peripheral blood, and then disappear and their presence cannot subsequently be demonstrated by blood examination or subinoculation of blood or organ extracts into healthy animals. If such rats which have thus recovered be further inoculated in the ordinary way with the same strain they exhibit a considerable degree of immunity which may even be absolute.

No satisfactory explanation of these facts can yet be offered.

W. Y.

SCHWETZ (J.) & FORNARA (L.). Y a-t-il des formes d'évolution des trypanosomes chez l'hôte vertébré ? [**Developmental Forms of Trypanosomes in the Vertebrate Host ?**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No 9. pp. 862–871. With 2 figs. [4 refs.] [Parasit. Lab., Stanleyville.]

Whilst making a series of smears from the cardiac muscle of a calf infected with *T. congolense* with the object of obtaining sarcocysts, the authors encountered a mass of organisms resembling leishmania, and with a view to discovering whether these were special forms of the trypanosomes invading the tissues, it was decided to cut sections and examine smears of the organs of animals dying from trypanosomiasis. Details are given of the examination of 8 calves. The blood and organs of the first 7 were completely negative, but the 8th showed the presence of parasites in considerable number in the organs. As a rule, only typical *T. congolense* were found, but smears of the brain and myocardium revealed also leishmania forms.

In addition to cattle, the authors examined a number of sheep and pigs. In one young pig, which was in very poor condition, examination of the peripheral blood showed the presence of numerous trypanosomes ; these bore some resemblance to *congolense* but were longer and thinner having, in the authors' opinion, more the appearance of *T. dimorphon* [possibly they were *T. simiae*]. The animal was killed and smears and sections of the

organs examined. In most of these trypanosomal and leishmania forms were found, sometimes in considerable numbers. [This paper should be compared with that of PERUZZI, this *Bulletin*, Vol. 25, p. 771].

W. Y.

ARNAUD (R.). Nouveau procédé de dosage des albumines rachidiennes. [**New Method of Estimation of Albumin in C.S.F.**]—*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 383-384.

In view of the fact that the new method for estimating the amount of albumin in the spinal fluid recently described by the author [*ante*, p. 237] has not given complete satisfaction, Arnaud has modified this technique somewhat. His present method is as follows :—

The cerebro-spinal fluid (4.3 cc.) is put in a Siccard's tube, heated to boiling, and then .5 cc. of the following reagent is added :—

Trichloroacetic acid ...	10 gm.
Alcohol, 95 per cent., ...	30 cc.
Carbon tetrachloride ...	2.5 cc.

The mixture is then well shaken and allowed to stand.

The author claims that with this solution it is possible to read the results in from 20 to 30 mins., whereas with the classical procedure 5 hours are required. As the result of his comparison with the classical technique, the author concludes that his method gives readings of about one-tenth less than does the latter technique.

W. Y.

SCHERN (Kurt). Ueber die Störung des Zuckerstoffwechsels bei Trypanosomiasen und Spirochätosen. [**The Disturbance of the Sugar Metabolism in Trypanosomal and Spirochaetal Infections.**]—*Biochem. Ztschr.* 1928. Vol. 193. pp. 264-268. [12 refs.] [Vet. High School, Montevideo.]

The author publishes in a table the results of daily estimations of the blood sugar in a normal rabbit, and in three rabbits and a horse infected with *T. equinum*. He believes that infection with trypanosomes may produce not only a hypoglycaemia, but at times a hyperglycaemia and that his investigations have shown that these infections must be regarded as problems in metabolism. This idea gives one a new insight into the pathology of the infection and creates new foundations for therapy.

W. Y.

LINTON (Richard W.). **The Blood Chemistry of an Acute Trypanosome Infection.**—*Jl. Experim. Med.* 1930. July 1. Vol. 52. No. 1. pp. 103-111. [14 refs.] [College of Physicians & Surgeons, Columbia Univ., New York.]

Recognition of the fact that the blood chemistry is altered has given a new direction to the study of experimental trypanosome infections. A brief summary is given of the work on this subject which has already been published. The author worked with a strain of *T. equiperdum* which killed rats in from 72 to 96 hours.

The following is the summary :—

"The CO₂ capacity of the serum is markedly lowered early in infection with *Trypanosoma equiperdum*.

"The non-protein nitrogen and uric acid constituents of the blood are increased in the terminal stages. The kidneys also show terminal degenerative changes.

"The cholesterol remains unchanged throughout.

"Lecithin is markedly increased, most of the observations showing a 20 per cent. to 50 per cent. rise in this substance.

"Liver glycogen is lower than normal in the early stages and could not be demonstrated in the later stages of the infection.

"The blood sugar remains normal until a very late period in the disease."

W. Y.

CALIFANO (L.) & GRITTI (P.). Ricerche sui fermenti dei tripanosomi. La lipasi, l'amilasi, i processi deidrogenativi (deidrogenasi) del *Trypanosoma brucei*. [The Existence of Ferments in Trypanosomes (*T. brucei*).]—*Riv. di Patologia Sperim.* 1930. Vol. 5. No. 1. pp. 9-15.

The author investigated the question of the presence or absence of lipase, amylase and reducing ferments in *T. brucei*. For the first he used the method of Roma and Michaelis, and found that the surface tension of a mixture of the test-suspension with one of *T. brucei* did not alter materially after prolonged contact, the fat not being acted upon. For amylase he used Hagedorn Jensen's process and again obtained negative results, there being no action in splitting polysaccharides. For the third he used Lipschitz's method of transformation of dinitrobenzol into nitrophenyl hydroxylamine, and found that an active oxidizing ferment was present.

H. H. S.

HARVEY (D.). Three Years in Central Angoniland with the Sleeping Sickness Commission.—*Jl. Roy. Army Med. Corps.* 1930. May. Vol. 54. No. 5. pp. 332-355. With 12 text figs.

A popular account of the work of the Royal Societies Sleeping Sickness Commission in Nyasaland 1911-1914.

W. Y.

STEUDEL. Der jetzige Stand der Schlafkrankheitsbekämpfung in Kamerun. [The Present Position of the Sleeping Sickness Campaign in Cameroons].—*Muench. Med. Woch.* 1930. Feb. 7. Vol. 77. No. 6. pp. 228-231. [2 refs.]

This article gives a critical account of JAMOT's work in the Cameroons [*ante*, p. 222.] The author laments the fact that German medical men no longer have the opportunity of working on this great problem.

W. Y.

STEUDEL (Emil). Der gegenwärtige Stand der Schlafkrankheitsbekämpfung in Afrika. [The Present Position of the Sleeping Sickness Campaign in Africa].—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 113-129 (197-213). With 2 text figs. (maps).

This article gives a general account of the history of sleeping sickness work in German East Africa and in the Cameroons; it contains nothing new and calls for no special notice.

W. Y.

CHAGAS (Evandro). Estudo electro-cardiographico na forma cardiaca da trypanosomiasse americana.—*Folha Med.* 1930. Apr. 25 & May 15. Vol. 11. Nos. 12 & 14. pp. 135-137. With 8 text figs; pp. 159-160. With 6 text figs. [Oswaldo Cruz Hosp., Rio de Janeiro.]

ZSCHUCKE (Johannes) & NAJERA (Luis). Observaciones sobre un caso mortal de tripanosomiasis humana tratado por el Bayer 205.—*Medicina Paises Calidos.* Madrid. 1930. Jan. Vol. 3. No. 1. pp. 39-44. French summary (5 lines).

CHOLERA.

LEGER (Marcel). Le choléra et son épidémiologie. [**Epidemiology of Cholera.**].—*Rev. Prat. Malad. des Pays Chauds.* 1929. Sept. Year 8. Vol. 11. No. 9. pp. 401-404, 407-415.

This is a long and interesting address on the history, causation and general epidemiology of cholera. The author points out that China and India are the permanent homes of the disease and gives some references to ancient writers from Chinese texts onward and dates of noted epidemics from 1761 to 1900 in India and China. He then describes the discovery of *V. cholerae* and the way of infection and transmission, including "Carriers." Mass infection generally comes from water, but food, fruit, etc., may be contaminated and give rise to outbreaks.

J. H. Tull Walsh.

MORISON (J.), CHOUDHURY (B. K. Pal) & RAHMAN (H.). **Cholera in a Khasi Village and its Treatment with Bacteriophage.**—*Indian Med. Gaz.* 1930. Mar. Vol. 65. No. 3. pp. 121-124. With 2 graphs in text.

This is a very interesting and well-written paper telling in detail of an outbreak of cholera in Jakrem, with its 744 inhabitants, which had never within the memory of the villagers been visited by cholera. On October 3rd, 1929, eleven men went south to seek work, but on arriving at Mardon they found cholera, and after staying one night, returned. One man who travelled with them died of cholera. There were other deaths at Ingimorolim. The Jakrem party were met by the village elders and forbidden to enter the village until the omens had been consulted. An egg-breaking ceremony was held to see if the cholera demon (Ka Khlam with six hands and no legs) was sitting on the shoulders of any of the Jakram party. The egg showed he was not there and the men entered the village bringing the cholera with them. The epidemic continued until the 28th. There were 143 cases with 70 deaths. The cases are divided into two groups, 10th to 17th, when no bacteriophage was available, and 18th to 28th, when bacteriophage was used and give the following figures: Group I: Cases 71, deaths, 51. Group II: Cases 72, deaths, 19. In the 65 cases receiving bacteriophage there were only 7 deaths. The bacteriophage was given with water every 2 to 4 hours until vomiting and purging ceased and urination began.

J. H. T. W.

SOUCHARD (L.). Essais thérapeutiques du choléra par le bactériophage de d'Hérelle. [**Treatment of Cholera with Bacteriophage.**].—*Ann. Inst. Pasteur.* 1930. Feb. Vol. 44. No. 2. pp. 125-140. [Pasteur Inst., Saigon.]

Having read the results obtained in India by M. D'HERELLE, the author, with the help of Dr. GAULTIER, secured the strain of bacteriophage used by D'HERELLE in 1927. For testing virulence the technique of D'HERELLE was closely followed, but in spite of

all precautions it was not possible to obtain the maximum virulence [this *Bulletin*, Vol. 26, p. 86 (D'HERELLE)]. Between December, 1928 and June, 1929, 27 cases were treated without any selection as to data of attack or severity of symptoms. The contents of one 2.0 cc. ampoule diluted with 10 to 15.0 cc. of cold water was given to each case in the author's presence and the contents of two other ampoules in a glass of water, were given in spoonfuls during the following three hours. The Table given shows that 24 died. Of the three that recovered the cholera vibrio does not appear to have been found in Nos. 7 and 15; it was found in Case 26. [See also this *Bulletin*, Vol. 25, p. 677 (Ross).]

J. H. T. W.

MIYAKE (Masunori). **On Cholera Like Symptoms produced by an Organism belonging to the Colon Group.**—*Saikingaku Zasshi (Jl. Bacteriology)*. 1929. Feb. No. 396. [Summarized in *Japan Med. World*. 1929. June 15. Vol. 9. No. 6. p. 197.]

The author failed to isolate *V. cholerae* from a patient with typical symptoms of cholera: vomiting, diarrhoea, dehydration and cramp. He did find in almost pure culture in the stools a bacillus which he calls "X." It resembles the typhoid bacillus, but is somewhat smaller and movement is more vigorous. It has several flagella and is gram negative. In cultural characters it resembles paratyphoid A and B; but the immunological reactions are entirely different. It is strongly toxic to the mouse, but not so strongly to guineapigs and rabbits. Serum of those immunized with this organism has an agglutination titre of 40,000 dilution. Symptoms the same as cholera but with bloody stools during convalescence. A second patient became ill with the same symptoms while nursing the first case.

J. H. T. W.

JOLLY (G.), DA COSTA (J. J. G.) & SHOUNG (Ah.). **The Value of Preventive Inoculation against Cholera.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 618-619.

For inoculation on a large scale it is essential that the procedure should be as simple as possible. It is evident that the method here adopted was the one of a single dose instead of two doses, separated by an interval. Large numbers were inoculated "during the course of the epidemic." The statistician, however, may cavil at the significance of the data obtained under such conditions. The difficulty of getting records which would serve for setting up frequency distributions of age, sex, social position, intelligence, infirmity, etc., of the contrasted populations, in fact, of the degree to which each was "at risk," is admittedly very great. It would be interesting to know if all the deaths occurring in the population concerned, before inoculation was begun, were debited to the non-inoculated.

W. F. Harvey.

KONRICH (F.). Ueber die Brauchbarkeitsdauer des Typhus- und Choleraimpfstoffs. [**Duration of Potency of Typhoid and Cholera Vaccines.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Oct. 31. Vol. 114. No. 4/6. pp. 420-427. [7 refs.]

With preparation of vaccines on a large scale the question of cost of manufacture becomes increasingly important. Experience suggests

that the effects of time and temperature are the most likely to be deleterious to potency, and economy demands that exact limits should be set to these factors. The tests here applied are two, the agglutino-genic and the protective action of the vaccines. It was found that they did not afford corresponding results. Obviously the protective action is that which should be preferred as a gauge of potency. Typhoid and cholera vaccines can be preserved for a much longer time than it has hitherto been judged safe to employ. A stay of two years in the ice chest will not result in any serious loss of potency. Even an ordinary room temperature is not very rapidly harmful. Refrigeration expense may be cut down considerably by restricting storage space, for which reason vaccines should be preserved in concentrated form and diluted as required. In order to eliminate all effect of temperature on potency it may even be advisable to cut out the usual sterilization by heat. Simple preservation of the living organisms in normal salt solution will in time afford a sterile preparation without any application of heat. One great advantage of making use of vaccines which have been kept for some time after preparation, is that the reaction caused by them on inoculation gradually diminishes to vanishing point.

W. F. Harvey.

FUJITSUNA (Sh.). Ueber den Unterschied zwischen der gewöhnlichen Vakzine und dem Kocktigen bezüglich Choleravibrionen in der Toxizität und im immunisatorischen Erfolge. [**Relative Toxicity and Immunogenic Power of Ordinary Cholera Vaccine and Kocktigen.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Mar. 28. Vol. 116. No. 2/3. pp. 180–185. [7 refs.] [Surg. Clinic, Imperial Univ., Kyoto.]

Kocktigen is a contraction for "Koktoimmunogen," which is the name given to a boiled suspension of bacteria or bacterial filtrate (see TORIKATA & FUJIMOTO, this *Bulletin*, Vol. 24, p. 796). The kocktigen cholera vaccine has a large minimum lethal dose; causes less leukopenia and a greater hyperleukocytosis; promotes better phagocytosis; gives rise to less local and systemic reaction and evokes greater antibody response than ordinary vaccine. The reason for this is that ordinary vaccine contains "impedin," which is destroyed by boiling and which paralyses immunizing action both *in vivo* and *in vitro*.

W. F. Harvey

UKIL (A. C.) & GUHA THAKURTA (S. R.). Sérum de convalescents de choléra. Variabilité de sa richesse en anticorps spécifique. Son emploi en thérapeutique. [**Variability of Convalescent Cholera Serum in Antibodies. Therapeutic Use.**]—*C.R. Soc. Biol.* 1930. Feb. 7. Vol. 103. No. 5. pp. 310–311. [1 ref.] [Chittaranjan Hosp., Calcutta.]

The bacteriolytic power of sera of patients convalescent from cholera was tested by the method of colony count at the stages: (1) when bile reappeared in the stools, (2) when the stools became solid, (3) one to three weeks after the stools became solid, when they no longer gave cultures of vibrios. The three stages are accompanied by progressive augmentation of the bacteriolytic power of the patients' sera and the last stage is maintained for several weeks. Sixty per cent. of cases admitted to hospital have been found able to furnish powerful bacteriolytic sera in the doses of 10 to 15 cc. for intravenous injection.

W. F. Harvey.

BRAHMACHARI (B. B.). Transformation of *Vibrio cholerae* into a Non-Agglutinating *Vibrio* and Back into the Agglutinating Type.—*Calcutta Med. Jl.* 1929. Nov. Vol. 24. No. 5. pp. 181-190. [7 refs.]

The strain used was a vibrio from an acute case of cholera which agglutinated with an anticholera serum to full titre of 1 in 8,000. A rabbit, after examination of its stools to exclude the possibility of vibrios being normally present, was inoculated intravenously on four successive occasions. The agglutination titre of the animal reached 1 in 16,000 with the last inoculation, after which it began to decline and ultimately reached zero. The vibrio isolated from the stool when agglutinin was at a maximum was highly agglutinable. With loss of agglutinin vibrios isolated became less and less agglutinable and finally inagglutinable, although a tendency to agglutinate at low titre reappeared before the animal finally died. Beginning with one of the non-agglutinating vibrios isolated, subpassages were made from guineapig to guineapig by intraperitoneal injection of vibrios isolated from the stools. The result was that the vibrio obtained from the stool of the 9th guineapig agglutinated with cholera serum again. Its reversion to a standard agglutinable vibrio was expedited by growing it in cholera antiserum. Thus the author claims to have accomplished the conversion of an agglutinable cholera vibrio into an inagglutinable form and then restored it to the original agglutinable form.

W. F. Harvey.

FINKELSTEIN (M. H.). The Haemolytic Properties of Cholera, Paracholera and Allied Vibrios, with Special Reference to their Effect on Blood Media.—*Brit. Jl. Experim. Path.* 1930. Feb. Vol. 11. No. 1. pp. 54-64. [4 refs.] [Bact. Dept., Univ., Edinburgh.]

Much of the confusion in description of vibrios as haemolytic and non-haemolytic has been due to the varying technique used and perhaps to the use of red cells of a resistant animal species. For the test ox or sheep blood should be used. In these experiments haemolysis was tested by adding varying quantities of vibrios grown in neutral peptone water to tubes containing 1 cc. of a 3 per cent. suspension of washed red cells in 0.85 per cent. salt solution. The tubes are kept for 4 hours at 37° C. and the readings then made.

One of the objects of these experiments was to distinguish between lysis of red blood cells and "clearing" of heated or "chocolate" blood agar. The latter effect is to be differentiated from the former; it is attributed to the conversion of haemoglobin into colourless derivatives and formation of alkali haematin. Classification of vibrios by their haemolytic action and by their ability to clear heated blood cannot be correlated with their serological characteristics. Vibrio strains which have a clearing effect when grown on medium containing heated blood also clear blood agar. The true cholera vibrio is non-haemolytic in marked contrast to the El Tor and paracholera vibrios. The El Tor vibrios, again, produce lysis in blood agar cultures, but have no clearing effect when grown on heated blood medium. Some strains of vibrio, on the other hand, can both lyse blood suspensions and exert clearing effect on heated blood medium. The blood lysis of El Tor and paracholera vibrios extends further into a blood agar medium than the brown-tinted clearing produced on that medium by vibrios which can act on heated blood. Lysis proper appears to be due to a filterable haemolysin and "clearing" of heated blood to "a chemically active agent possibly of ferment nature capable of splitting haemoglobin into alkali haematin and other products."

W. F. Harvey.

SORU (Eugénie). Tension superficielle des suspensions de vibrions cholériques normaux et sensibilisés. [**Surface Tension of Normal and Sensitized Cholera Vibrios.**—*C.R. Soc. Biol.* 1930. Feb. 28. Vol. 103. No. 8. pp. 635–637. [2 refs.]

The fluid in which the organisms were suspended was isotonic saccharose. Those acted on by normal serum and by cholera serum were first washed free of serum before being suspended in saccharose for test. These tests showed that specific antiserum caused marked lowering of surface tension in the case of bacilli acted on by it. Normal serum or non-specific agglutinating serum caused only slight lowering.

W. F. Harvey.

SOELEIMAN (Mas M.) & VAN NIEKERK (J.). Cholera toxine. [**Cholera Toxin.**—*Zent. f. Bakt.* I. Abt. Orig. 1930. June 3. Vol. 117. No. 1/3. pp. 19–30. [10 refs.] [Inst. for Trop. Med., Reich Univ., Leiden.]

The nature of the cholera toxin has been much disputed. Its development has been explained on such theories as that : (a) It is due to the decomposition of the medium in which the vibrios grow. (b) The living vibrios excrete a toxic metabolic product, denominated soluble toxin or exotoxin. (c) During the life and after the death of the vibrios a substance is formed which is not toxic, but becomes so on admixture with serum (anaphylaxis theory). (d) The toxin is closely bound to the body of the vibrio and is only set free at its death ; the so-called endotoxin theory. In this research a number of true cholera strains were used and, as a control, a toxic vibrio known as Calcutta 30. The medium on which the vibrios were grown had the composition : bouillon of pH 7.7, 45 cc. ; glucose, 0.45 gm. ; buffer solution of pH 8, 5 cc. ; chalk 1 gm. Toxin was obtained by centrifugation of the bouillon culture at 9,000 revolutions a minute, representing a pressure of 3,500 kgm., and subsequent concentration of the supernatant fluid by evaporation to dryness. Guinea pigs inoculated intraperitoneally showed the usual symptom-complex of cholera intoxication. Further experiments showed that the toxin of Calcutta 30 differed markedly from that of the cholera vibrios in that it exercised a paralysing action by perfusion through the living rabbit heart, whereas the latter did not. The conclusion reached by the authors is that, by the action of the acids developed in the culture medium and by the pressure to which the vibrios are subjected in centrifuging, the bacterial membrane is rendered permeable and bacterial protoplasm is passed into the surrounding bouillon. It is, again, a verdict given in favour of cholera toxin being an endotoxin. The toxin of Calcutta 30 did not show itself capable of giving rise in immunized rabbits to an antitoxin.

W. F. Harvey.

REVIEWS AND NOTICES.

THOMPSON (W. R.) [Ph.D., D.Sc., Assistant Director, Imperial Bureau of Entomology, and Superintendent, Farnham House Laboratory]. **The Biological Control of Insect and Plant Pests. A Report on the Organisation and Progress of the Work of Farnham House Laboratory.**—1930. June. 124 pp. With 8 plates. E.M.B.29. London: H.M.S.O. [1s.]

Farnham House in Buckinghamshire with its laboratories, insect-houses and other equipment, and its 6½ acres of plantation and tillage, was founded in 1927 by the Imperial Bureau of Entomology for the experimental study of the insect-pests of crops, orchards, plantations, forests, and even of certain livestock, and of the parasites and other foes that attack and keep such insect-pests in check. As a cognate study the insects that ravage and check the spread of "weeds" that make vain the labours of the husbandman are also included.

These studies, as pursued at Farnham House, have two aspects. On the one hand, the life-histories of the individual insect-pests and of their respective parasites and natural opponents have to be accurately traced step by step (in all their stages) by observation in the field and experiment in the laboratory and insect house. On the other hand, when the vital intercurrents between a pest and its parasites (and other foes) have become known, the problems of "domesticating" the chosen parasite—that is to say of collecting it and of breeding it on a large scale for transport perhaps to distant parts of the world where it is to be colonized and brought into the service of the farmer and planter—have to be very carefully thought out. How difficult the first of these studies is can only be realized by a careful perusal of the third chapter, on the *Struggle for Existence*, in DARWIN'S *Origin of Species*; and how difficult and ingenious the processes of collecting and of breeding and shipping the parasites and providing a hospitable reception for them in a new home may be, is explained in the present volume. There are snares in these intricate studies at the very outset; for in collecting the supposed parasites of a particular noxious insect, some of them may prove to be not parasites of that insect at all, but parasites of that insect's parasites—may be the unsuspected allies of the insect-pest, not the foes that are the object of our desire.

Taking the insect-pests of agriculture as pests, without any close inquiry into history, all we need to know is that in the course of world trade they may be carried, unwittingly, from one country to another and from continent to continent by man, and that when an insect-pest reaches some new country, where it is not troubled by the parasites and foes that keep it in check in its native home, it is likely to establish itself and to multiply and spread until it becomes a serious and costly menace. Thus "of the 183 worst insect-pests existing in North America almost half have been introduced from foreign countries," and among them "the European Corn-borer, which reached America about 15 years ago, has done so much damage that . . . in 1927 the sum of two million pounds was expended to arrest its spread." A similar story is told of the Hessian Fly, the Gipsy Moth, the Oriental Peach Moth, the Japanese Beetle, and the Mediterranean Fruit Fly. Although periodic fumigation and spraying may mitigate this havoc, such methods are recurrently expensive and may even be risky to man himself—as when arsenic is too freely used to nip the Codling Moth; and although legal enactments against noxious insects may have replaced the priestly interdicts of olden times, even the decrees of the law may be overlooked—since "several of the most injurious insects existing in the

United States were introduced in recent years in spite of the inspection services."

Fumigation and poison-sprays will always retain a place as temporary and seasonal palliatives, but for abiding defence against the settlement of immigrant insect-pests the modern policy is to bring their native foes—particularly their specific parasites—face to face with them; and these foes may have to be discovered and selected, and may have to be bred and be brought from afar in big battalions, and at first they may want some nursing before they settle to work in fresh woods and pastures new. All this organized work and its basal principles and methods, is very lucidly set forth in the present volume. The standpoint, it is true, is that of the husbandman and planter, but to the appreciative medical officer it demonstrates that the biological control of creatures inimical to man and his works is not a careless game of chance, but is a thorny task needing some attention to the principles of biology, much forethought, and a skilful and ever ready technique—is, in short, a scientific industry.

A. Alcock.

GREENWAY (Diego Francisco) [Jefe del laboratorio de Parasitología de la Facultad de Medicina de Buenos Aires]. **Zooparasitos y zooparasitosis humanas.** [Animal Parasites and Human Infection.] 2a Edición.—481 pp. With 212 text figs., 62 figs. on 20 plates (2 coloured) & 2 diagrams. 1929. Buenos Aires: "El Ateneo," Librería Científica y Literaria. Florida 371—Cordoba 2099.

This is the second edition of Dr. Greenway's book, but contains no indication as to the length of time which has elapsed since the first. The author in his preface disarms criticism by stating twice in a page that he makes no pretence that the book will fill a vacuum; there is no need for him to insist on this for if there is no room for it in the first instance it will assuredly make a place for itself. The intention as stated is "to present in concise form and as graphically as possible what it is necessary for the beginner to learn, without uselessly burdening his memory," in other words, an accurate and not too detailed a text-book. After a brief sketch of the history of parasitology, a short chapter is given on methods of examination. The various helminths are then dealt with seriatim, giving the description, the life-history, mode of infection, diagnosis, pathogenic action and treatment where applicable in each case; these are followed by descriptions of arthropods and protozoa. The graphic representations, most of them original, of the mode of infection of man and the life histories of the worms impress the chief facts on the mind of the student at a glance. Instructive tables are presented giving the localization (of protozoa, for example), the disease produced, the evolution of the parasite and the way by which man becomes infected. We note that *Ascaris lumbricoides* and *Belascaris* are both described, but no mention is made of *Physaloptera*, a worm not infrequently but erroneously regarded as *Ascaris*. Also, for making a faeces culture the old and messy procedure with animal charcoal is mentioned, but no reference to the better and cleaner Petri dish and blotting paper method. *Dracunculus medinensis* is said to pour out her embryos through the mouth. *Leptospira icterogenes* and *L. icterhaemorrhagiae* are described separately and different measurements are given for them, nevertheless on the succeeding page is the statement that "the spirochaetes discovered by Noguchi are identical with *Leptospira icterohaemorrhagiae*." Lastly, the organism of ratbite fever is designated in more than one place *Spirella morsus muris*. As a whole, however, the information is accurate and the facts tersely expressed; the book is well produced, the illustrations and schematic representations remarkably clear, the type and paper good and misprints

very few. The author is to be congratulated on the way in which he has fulfilled his task of writing a concise introduction to the larger and deeper works on human parasitology.

H. H. S.

GIORDANO (Mario) [Maggiore Medico della R. Marina, Specialista in Patologia coloniale]. **Medicina ed Igiene Coloniale. Ad Uso degli Infermieri, Militari di Sanità, Missionari, ecc.** [Medicine and Tropical Hygiene.]—pp. xiv+495. With 130 figs. & 1 folding map. 1930. Milan: Ulrico Hoepli, Editore Libraio della Real Casa. [Lire 22.50.]

This manual (a handy volume, which can be carried in the pocket) more than fulfils the ends in view as stated in the preface, but at the same time it is not easy either to assess its value or to state what niche it can profitably occupy. The book is intended to give a simple and clear account of information useful for nurses, missionaries, navigators and travellers generally in the Colonies, and a wide field is covered. The first chapter of 28 pages, 6 of which are wholly taken up by illustrations, gives an account of the anatomy and physiology of the human body. Next follows one of 15 pages on climate, clothing, food, exercise, and general hygiene, including ethnology. The third and longest chapter gives brief accounts of infective and contagious diseases, followed by others caused by worms and by arthropods. Each is considered under the heads of definition, symptoms, treatment and prophylaxis. The deficiency diseases are dealt with in ten pages which include also a general account of vitamins. The remaining chapters deal with first aid and accidents, disinfection, laboratory examinations and international legislation.

The work, from its nature, cannot do more than skim over the surface of such a large number of subjects, but it is interestingly written, copiously and well illustrated, well printed and in a handy form. For nurses and those who can fill in the gaps by questioning a medical man, the book would be of considerable use, but we doubt whether the owner-navigator would spend time in mastering chemical urinalysis or the staining of blood smears and sputum and whether the knowledge when attained would convey to his mind anything which he could usefully apply. However, if a little knowledge is a danger, it is perhaps better to err on the side of excess of the former with the hopes of diminishing the latter.

H. H. S.

DE CASTRO (A.). **Die speziellen Krankheiten der warmen Länder und der Tropen. Kleines Handwörterbuch.** [Diseases of Warm Climates.]—87 pp. 1930. Leipzig: Johann Ambrosius Barth. [Rm. 4.80.]

The author does not claim any originality in this work, nor does he intend that it shall replace the well-known text books on diseases of the tropics. His aim is to provide a small compendium for the information of the general practitioner. The arrangement is alphabetical and each disease is dealt with under the headings of definition, aetiology, course, pathological anatomy, prognosis, diagnosis, treatment and prophylaxis. The weakest section in most cases is that of diagnosis which is often expressed in a word or two, such as "by microscopical examination." To compress the essentials of the diseases of warm climates into the small space of 87 pages must have been no light task, and it would be easy to pick holes in the work, but, to mention the good points, it may be said that with a few exceptions (yellow fever is one, and no mention is made of *T. rhodesiense* and the results of infection by it) the information is correct and fairly up-to-date, very succinctly expressed and the whole would form an excellent

book for rapid revision by a student on the point of presenting himself for examination, in other words a final cram-book which could be gone over in an evening.

H. H. S.

SOCIEDAD ARGENTINA DE PATOLOGIA REGIONAL DEL NORTE. **Quinta Reunión . . . celebrada en Jujuy del 7 al 10 de Octubre de 1929.** [Fifth Meeting of Pathological Society of Northern Argentine.] Vol. 1.—706 pp. With numerous illustrations. 1930. Buenos Aires: Imprenta de la Universidad.

The Pathological Society of Northern Argentine has published their first volume of papers read at the fifth meeting which took place in October, 1929. The articles collected here are divided into four groups. Some are concerned with academic research on pathological matters of a purely experimental character, others deal more with pathology in connexion with clinical medicine. In the first group are 7 papers relating to General Pathology and Experimental Medicine: in the second, 27 papers on Mycology and Bacteriology, several of which treat of blastomycotic infection of man, localized or general, and the cultural and experimental work connected therewith. The third and largest group comprises 31 papers on Dermatology and Syphilis, the most important from the view of the tropical practitioner being a series of contributions on Leprosy. These are reviewed separately in this *Bulletin*. In the final group are 4 articles on yellow fever. In all, therefore, there are 69 papers covering a wide field. Much of the matter is not actually new; in fact, in congresses such as this the end is attained if the contributors give an accurate summary of the advances made since the previous meeting, and that purpose is fulfilled here. The papers must doubtless have led to profitable discussions which naturally, though unfortunately, are not included in this publication; their inclusion would have made the volume unwieldy and thus have impaired its usefulness.

H. H. S.

ROBERTSON (O. H.) [M.D.] & CHEER (S. N.) [M. D.] [Compiled by]. **Manual for the Medical Services of the Peiping Union Medical College Hospital.** 3rd Edition Revised by the Staff of the Department of Medicine.—pp. vi+174. With 3 plates & 2 text figs. 1930. Peiping: P.U.M.C. Press. [Mex. \$1.50.]

This is the third edition of a manual which appeared first in 1922. It is written primarily as a guide to the resident staff of the college, but the indications laid down would apply to any hospital of moderate size, say of 200–300 beds. The first section deals with staff organization and the relations to be maintained between members of the staff, together with notes on general hospital routine. The remaining five sections deal more directly with the patient himself. Two treat of case-taking and note-making from the clinical aspect, then follows one on laboratory studies, including blood, faeces and urine examinations, analysis of gastric contents, etc., and one on diagnostic procedures somewhat arbitrarily separated from the last. Finally, therapeutic procedures are detailed such as the performance of paracentesis abdominis (examination of the fluid removed comes in a previous section), intravenous injection of arsenicals, blood transfusion, intramuscular injection of bismuth and other drugs including antisera. Appended is a table of normal values which will be most useful to the student when interpreting results of the various tests. There are three plates depicting respectively the commoner helminth ova drawn mostly to scale, and the protozoa in the vegetative and the cystic stages.

H. H. S.

WELLCOME HISTORICAL MEDICAL MUSEUM. **Souvenir Henry Hill Hickman Centenary Exhibition 1830-1930 at the Wellcome Historical Medical Museum, 54, Wigmore Street, London, W.1.—**85 pp. With 24 illustrations. 1930. The Wellcome Foundation Ltd.

This book contains a preface by Dr. John D. COMRIE, a list of the Hickman exhibits at the Wellcome Historical Medical Museum, a foreword by Dr. Dudley Wilmot Buxton and an account of the life and experiments of Hickman, pioneer in anaesthesia. Hickman in 1824, we are told, carried out experiments by operating painlessly on animals after the administration of carbon dioxide gas. (Humphry Davy, in 1800, had suggested nitrous oxide for this purpose). Hickman applied to the Royal Society and afterwards to Charles X of France, but no notice was taken of his claims. He died in 1830 at the age of 29. The book is well printed, contains reproductions of autograph letters and a representation of the title page of the pamphlet—"A Letter on Suspended Animation, containing Experiments showing that it may be safely employed during Operations on Animals, with the view of ascertaining its probable utility in surgical operations on the Human Subject, addressed to T. A. Knight, Esq., of Downton Castle, Herefordshire, one of the Presidents of the Royal Society."

A. G. B.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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YELLOW FEVER.

MARTINI (E.). Tiergeographische Gesichtspunkte zur Beurteilung der Geschichte und Epidemiologie des gelben Fiebers. [**A Zoo-Geographical Survey of the History and Epidemiology of Yellow Fever.**].—Reprinted from *Verhandlungen d. Deut. Gesellsch. f. angewandte Entom. E. V. auf d. siebenten Mitgliederversammlung zu München vom 31. Mai bis 2. Juni 1928.* 1929. pp. 76–81.

An interesting discussion of certain aspects in the problem of the original source of yellow fever. The author brings forward very strong evidence in support of the view that Africa is the original home of the disease and that it was introduced into America very soon after its discovery. The endemic nature of yellow fever in Africa, contrasted with the epidemics of the New World; the subgenus *Stegomyia* being essentially an African group that has spread from there to other parts of the world; and the historical evidence as to the epidemics in Mexico during Montezuma's reign, are among the arguments supporting this view. [The article should be read in its entirety by those interested in the subject.]

E. Hindle.

PEYROT (J.). A propos de la fièvre jaune. [**Yellow Fever.**].—*Marseille-Méd.* 1930. Jan. 25. Vol. 67. No. 3. pp. 132–144.

After an account of some of the recent work on yellow fever, the author discusses certain aspects of the epidemiology of the disease. When in the French Soudan the author helped in a small outbreak of yellow fever which suddenly appeared after a long period without record of cases. Cases of the disease are said to have occurred at Sansanding and Koury in 1902 to 1903, and no more were observed until twenty years later at the neighbouring town of Segou-Sikoro. [These towns are on the upper part of the Niger, 600 to 700 miles from the coast.] In order to explain the persistence of the disease during this latent period the author inclines to the view that unrecognized cases of yellow fever are continually present and serve to maintain the infection in the mosquitoes, which under certain conditions, such as the introduction of non-immunes, etc., may give rise to an epidemic outbreak. It is aptly

pointed out that prophylactic measures directed against *Aedes aegypti* should never be relaxed, and that if such measures had been systematically applied in Dakar it should not have been possible to find the enormous number of breeding places for mosquitoes furnished by the mass of empty tins, bottles and similar rubbish, amounting in 1927 to more than "50,000 cubic metres." After the yellow fever outbreak this rubbish was cleared away, but it is obvious that for many years the sanitary measures must have been severely handicapped either by lack of personnel, or money, or both.

E. H.

MONTEIRO (J. Lemos). A febre amarella a luz das modernas aquisições experimentaes. [**Yellow Fever in the Light of Recent Research.**]—*Brasil-Medico*. 1930. May 31. Vol. 44. No. 22. pp. 588-596. [31 refs.]

A clearly stated summary of the work done on yellow fever during the last 2-3 years. All the points referred to have already been noted in this *Bulletin*, with the exception that *Cimex lectularius* can pass the virus still active in its faeces up to 15 days after feeding on an infected rhesus.

H. H. S.

BAUER (Johannes H.) & HUDSON (N. Paul). **The Duration of Immunity in Human Yellow Fever as shown by the Protective Power of the Serum.**—*Jl. Preventive Med.* 1930. May. Vol. 4. No. 3. pp. 177-178. [7 refs.]

The authors tested the sera of four persons who had had yellow fever in Mexico, the Panama Canal Zone, or New Orleans, 23 to 26 years previously.

Protection tests were made in monkeys using 5 cc. of the serum for each animal, except in one case when 3 cc. and 4 cc. respectively were inoculated, and a quantity of virus containing at least 1,000 lethal doses was inoculated three hours later. The sera of three out of the four patients protected the monkeys against the disease. In addition serum from patients 4, 8 and 16 years after attacks was found to be protective.

It is evident, therefore, that an attack of yellow fever confers a lasting immunity. Since an African strain of virus (the Asibi) was used in these tests it is also evident that the disease is identical in Africa and America, and the yellow fever of 1902 and 1905 is immunologically the same as that now existing.

E. H.

PUBLIC HEALTH REPORTS. 1930. June 27. Vol. 45. No. 26. pp. 1457-1459. **Quarantine Regulations of Airships against Yellow Fever. Report of the President of the Commission on Yellow Fever at the Meeting of the Permanent Committee of the International Office of Public Hygiene, May, 1930.**

The Commission was of the opinion that it is premature to formulate articles for an aerial convention applicable to yellow fever. Provisionally it recommended that passengers travelling by air and starting from an infected area should be under observation for six days before

embarking and six days after arrival. The Commission held that three days is the limitation of the period during which a person sick with yellow fever should be isolated.

E. H.

DE MELLO (E. Jansen). Medida do progresso e eficiencia dos serviços anti-larvários nas campanhas contra a febre amarella. **Measure of the Progress and Efficiency of Anti-Larvae Measures in Campaigns against Yellow Fever.**—*Archivos de Hyg.* Rio de Janeiro. 1930. May. Vol. 4. No. 2. pp. 207–219. With 2 figs. English summary.

The author's conclusions are as follows :—

" 1. The use of mosquito indices and of other indices is commendable for measuring the progress and efficiency of anti-larvae measures in campaigns against yellow fever.

" 2. Since each of them has a different meaning and also for the sake of comparison, at least the following proportions should be systematically computed: (1) the ratio of houses with breeding-places to all houses examined (*house index*) and (2) the ratio of breeding-places to the total number of houses visited (*density index*).

" 3. As a complement to these indices, the ratio of breeding-places to the total number of receptacles (*deposit index*) and, likewise, other ratios particularly interesting in special cases and localities, could be used to advantage.

" 4. The ratio of receptacles found with living larvae-consuming fish to the total number of receptacles capable of supporting fish life (*fish index*), which has been proposed by the author, has proved to be a useful measure of efficiency in supplying dwellings with fish.

" 5. The regular observation of the various indices, which is greatly assisted by the graphic method, is capable of providing the administration with a better knowledge of the progress attained and of tendencies in the efficiency of the campaign."

E. H.

SOREL (F.) & ARMSTRONG. Désinfection des immeubles de Dakar à la suite de l'épidémie de fièvre jaune de 1927. [**Disinfection of Dwellings at Dakar after the 1927 Epidemic of Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1928. Nov. 14. Vol. 21. No. 9. pp. 808–816.

In using sulphur dioxide for the destruction of mosquitoes and rodents in Dakar, it was found that much less elaborate sealing up of cracks and crevices was necessary than has been the common practice. Hanging blankets or the like over the principal openings was found to be sufficient.

When sulphur was burnt under such conditions 30–40 gm. per cub. m. was required, the premises remaining closed for 4 hours. Using SO₂ under pressure (from cylinders) 20 gm. of gas with 2 hours closure or 30 gm. gas and 45 minutes closure sufficed. The compressed SO₂ gave the best results since it produces the most rapid saturation of the atmosphere.

Pyrethrum is untrustworthy since the stupefied mosquitoes will recover unless promptly swept up.

J. F. C. H.

CRUZ (J. da Costa). [In Portuguese & English.] O diagnostico da febre amarella pela dosagem da alexina. **The Diagnostics of Yellow Fever by Dosage of Alexin.**—*Mem. Inst. Oswaldo Cruz.* 1930. Vol. 23. No. 3. In Portuguese pp. 109–130. [45 refs.] In English pp. 131–151. Also in *Brasil-Medico.* 1930. Feb. 22. Vol. 44. No. 8. pp. 220–230.

The author gives full details of the application of this test, together with a record of the results of examining the amount of complement in 103 cases [see this *Bulletin*, Vol. 26, p. 1003]. Every case of yellow fever showed a diminution in the amount of complement, and in addition, a case of malaria, and five other cases diagnosed clinically as influenza. The amount of complement seems to be of importance for prognosis, as severe cases showed a greater diminution than mild ones. The decrease is found to be mainly due to a loss in the albumin fraction of the complement.

E. H.

CRUZ (J. da Costa). Sur un cas curieux de fièvre jaune au point de vue diagnostic par le dosage de l'alexine. [**An Abnormal Case of Yellow Fever and its Diagnosis by the Amount of Alexin.**]—*C.R. Soc. Biol.* 1930. June 13. Vol. 104. No. 20. pp. 623–624. [1 ref.]

This is a further account of a case which, although diagnosed clinically as yellow fever did not show any diminution in the quantity of alexin, and consequently was mentioned as an exception to this rule [this *Bulletin*, Vol. 26, p. 1003]. Protection tests in two rhesus monkeys, using the serum of this patient after his recovery, show that the disease cannot have been yellow fever, for neither of the monkeys was protected. It would seem, therefore, that a diminution in the quantity of alexin is a constant feature in yellow fever, and will help to distinguish it from other diseases which it clinically resembles.

E. H.

PENNA (Oswino) & DE FIGUEIREDO (Burle). Diagnostic histo-pathologique de la fièvre jaune par les lésions de Councilman. [**The Histo-pathological Diagnosis of Yellow Fever by Councilman's Lesions.**]—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1346–1347. [Oswaldo Cruz Inst., Rio de Janeiro.]

In order to distinguish yellow fever from other conditions involving necrosis of the liver, the authors point out the characteristic features of necrotic liver cells in yellow fever, especially in human beings. The necrosed cells lose connexion with adjoining liver cells; they lose their polygonal shape and become more or less ovoid or amoeboid and generally become smaller than normal cells; the protoplasm is extremely acidophilic; the cytoplasm becomes hyaline, and homogeneous; the majority of the cells show neither pyknosis nor karyorrhexis; in other cases the nucleus disappears and stages in its dissolution may be observed. The necrosis and fatty degeneration generally proceed together in the affected liver cells. In contrast to other liver intoxications in which the cells are destroyed and autolysed, in yellow fever the majority of the cells, although necrotic, persist and can still be distinguished. With regard to both necrosis and fatty degeneration one of the most characteristic features is that even in advanced cases of yellow fever these changes do not occur in the neighbourhood of the

portal veins, whilst in other liver affections the necrosis or fatty degeneration is spread throughout the lobule. In monkeys these changes may be variable, and it is better to depend on the presence of the oxychromatic intranuclear inclusions.

E. H.

JAKOB (A.), FIALHO (Amadeo) & VILLELA (End. Lib.). Ueber die Veränderungen im Zentralnervensystem bei Gelbfieber. [**Changes in the Central Nervous System in Yellow Fever.**]—*Deut. Ztschr. f. Nervenheilk.* 1929. Dec. Vol. 111. Nos. 1-6. pp. 111-116. With 5 text figs.

A more detailed account, with microphotographs, of changes in the central nervous system of yellow fever cases obtained during the 1928 epidemic in Rio de Janeiro [see this *Bulletin*, Vol. 26, p. 298]. In addition to the changes previously mentioned in the preliminary note it is of interest that the ganglion cells often showed more or less intense degeneration of the nucleus with fatty degeneration of the cytoplasm.

E. H.

DINGER (J. E.), SCHÜFFNER (W. A. P.), SNIJDERS (E. P.) & SWELLEN-GREBEL (N. H.). Ondersoek over gele koorts in Nederland. (Vierde Mededeeling.) [**Research on Yellow Fever. 4th Communication.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. May 31. 74th Year. 1st Half. No. 22. pp. 2732-2741. [5 refs.]

The 1st (this *Bulletin*, Vol. 26, p. 1006) and 2nd and 3rd communications [*ante* pp. 485-6] have already been noticed. In this article the marked difference in susceptibility to yellow fever of adult *M. cynomologus*, as compared with the great susceptibility of the closely allied *M. rhesus*, is made the subject of special commentary. The general impression is that young animals, including man, are less susceptible than old. But the contrary is found to be the case with *M. cynomologus*. It seems probable then that the insusceptibility of the older animals must be acquired and the question arises, how? One thinks immediately of the possibility of some allied disease as the immunizing agency, since yellow fever itself is not known to occur in the Dutch East Indies. The dengue group of fevers is the most likely possibility in the case. Attention has already been drawn to the similarity between these two diseases as shown by the tendency to affect the new comer, the saddle temperature curve, the clinical symptoms (muscular pains), the transmission by *Aedes aegypti*, the duration of the "extrinsic incubation," the duration of infectivity of the patient's blood (first 3 days) and the filtrability of the virus. On the other hand experiments with the serum of dengue convalescents have failed to show neutralization of yellow fever virus, and it has not been accepted in the southern states of North America that an attack of dengue protects against yellow fever. Experimentation, however, on these lines is being carried out and the results should prove interesting. Another species of monkey, commonly found in Sumatra, *M. nemestrinus*, has also been found to be little susceptible to yellow fever inoculation.

W. F. Harvey.

DINGER (J. E.), SCHÜFFNER (W. A. P.), SNIJDERS (E. P.) & SWELLEN-GREBEL (N. H.). Untersuchungen über Gelbfieber in den Niederlanden. [**Researches on Yellow Fever in Holland.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Aug. 28. Vol. 118. No. 1/2. pp. 6-12. [Trop. Inst., Amsterdam.]

The first part of this paper was published elsewhere [*ante*, p. 486]. The second part contains records of transmission experiments with a strain of *Aedes aegypti* from Togoland. The first batch of these mosquitoes was fed on an infected rhesus and then respectively, 20 and 30 days later, on normal animals neither of which showed any signs of infection. When subsequently inoculated with virus one of these monkeys was resistant and the other had a non-fatal infection. A second batch was fed on infected monkeys and subsequently after intervals of 22, 37, 61 and 100 days respectively fed on normal monkeys. The monkey bitten by mosquitoes after 22 days' interval showed no signs of infection and when subsequently inoculated with virus died of yellow fever. Four other monkeys bitten by mosquitoes after intervals of 37 to 100 days all became infected and three of them succumbed to the disease. It would seem, therefore, that the extrinsic incubation period of yellow fever in the mosquito may be prolonged under certain conditions.

E. H.

ARAGÃO (H. de Beaurepaire) & LIMA (A. da Costa). [In Portuguese & French.] Novas experiencias sobre a febre amarela. Nouvelles expériences sur la fièvre jaune. [**New Experiments on Yellow Fever.**]—*Mem. Inst. Oswaldo Cruz.* 1930. Vol. 23. No. 2. In Portuguese pp. 99-101. In French pp. 102-104.

— & —. Nouvelles expériences sur la fièvre jaune. Quantité de virus chez le moustique.—*C.R. Soc. Biol.* 1930. June 13. Vol. 104. No. 20. pp. 619-622.

The authors triturated three *Aedes aegypti* infected with yellow fever in 1 cc. of distilled water and then made progressive dilutions of the resulting emulsion. Fatal infections were produced in rhesus monkeys by the inoculation of 1 : 10,000, 1 : 100,000 and 1 : 1,000,000 respectively of the original suspension.

In a second series of experiments a single infected mosquito was similarly triturated in 1 cc. distilled water and dilutions of 1 : 1,000, 1 : 10,000 and 1 : 100,000 produced typical yellow fever in rhesus monkeys. Since the volume of the mosquito is very much less than 1 cc. and in both these experiments the dilutions start from the original suspension of this volume, it is evident that infected mosquitoes must contain several million lethal doses of the virus. In addition the authors fed infected mosquitoes on monkeys through flannel in order to avoid any possible contamination by the insects' faeces. Fatal infections were produced in two monkeys and at the same time the faeces were also found to be infective.

Two experiments to determine the minimum incubation period gave conflicting results. In the first case the mosquitoes after 4 and 10 days incubation period respectively failed to infect monkeys, but were found infective after 16 days. In the second case, a fatal infection was produced in a monkey by the bites of 5 mosquitoes, fed through

flannel, after an incubation period of only four days. [The results of this last experiment are difficult to understand for they are at variance with the results of all previous observations, which have shown that the extrinsic incubation period of yellow fever in the mosquito is never less than 9 to 12 days.]

E. H.

BAUER (Johannes H.) & MAHAFFY (Alexander F.). **Studies on the Filtrability of Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1930. July. Vol. 12. No. 1. pp. 175-195. [4 refs.] [Labs. of the West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

An account of filtration experiments with the blood of infected monkeys and infected mosquitoes showing that the virus is able to pass through Berkefeld filters of all grades without any marked diminution in concentration, and also through Chamberland L11 candles.

The most interesting section of the paper is that dealing with the action of various solutions on yellow fever virus, which was found to die out within 6 hours or less when suspended in 0.9 per cent. sodium chloride, Locke's solution, Ringer's solution, hormone broth, or distilled water; when 10 per cent. or more of normal serum was added to saline or distilled water, the deleterious affect of these media on the virus was very much reduced. The deleterious effect of saline on the virus would explain the negative results of previous filtration experiments with infected mosquitoes since in these cases the ground up mosquitoes were suspended in saline solution. When 10 per cent. serum was used as a suspension for the mosquito emulsion, the virus was found to pass through the filter without any difficulty.

The results of titration experiments using 10 per cent. serum, instead of ordinary saline, show that the blood of infected monkeys may contain a very high concentration of virus up to as much as 10,000,000 lethal doses per cc.

E. H.

LEWIS (Paul A.). **The Survival of Yellow Fever Virus in Cultures.**—*Jl. Experim. Med.* 1930. July 1. Vol. 52. No. 1. pp. 113-119. [5 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

The author injected various culture media with blood and tissues from rhesus monkeys infected with yellow fever. The virus was found to survive at least 9 days in egg serum medium kept at 35° C., and 12 days in Marchoux's medium at the same temperature. In Noguchi's semisolid medium the virus survived 7 days at room temperature. There was also incomplete evidence of survival for 18 days in egg serum medium, for a monkey inoculated with the culture showed fever and when subsequently inoculated with virus did not succumb, although a rise in temperature was observed. It was believed by the author, who unfortunately died of yellow fever in Bahia on June 30th, 1929, that the infections recorded by KUCZYNSKI may have been caused

by virus surviving in the medium, and not by the visible organisms cultivated. The author obtained no visible growth or reproduction of the virus in any of his cultures. In a series of dilution experiments he was able to infect rhesus monkeys with 0·00001 cc. of infectious blood in the case of two strains, and with 0·000001 cc. employing the Asibi strain.

E. H.

HINDLE (E.) & FINDLAY (G. M.). **The Electrical Charge of Yellow-Fever Virus.**—*Brit. Jl. Experim. Path.* 1930. Apr. Vol. 11. No. 2. pp. 134-136. [5 refs.] [Wellcome Bureau of Scientific Research, London.]

The authors have investigated the electrical charge of the virus of yellow fever, using Bedson and Bland's method of immersing strips of blotting paper in suspensions of the virus in varying hydrogen ion concentrations. If negatively charged relative to the blotting paper, the virus particles ascend the paper and their presence may be detected by inoculating suspensions of the paper into monkeys. It was found that the virus of yellow fever is negatively charged at pH ranging from 5·2 to 7·0 and is destroyed in acid media of pH 3·0 to 4·0.

E. H.

THEILER (Max). **Studies on the Action of Yellow Fever Virus in Mice.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 249-272. [11 refs.] [Harvard Med. School, Boston.]

An interesting account of the infection of mice with yellow fever virus. The author inoculated the virus intracerebrally and in every experiment some of the mice became ill and died with symptoms of encephalitis. The virus seems to be capable of being propagated indefinitely in mice by brain to brain inoculations. Whereas the first mice to be infected became ill after 8 to 14 days, by the fifth passage they became ill on the 6th or 7th day, and died the following day. At the 20th passage, the average was one day shorter and the interval gradually diminished until the average of the 50th to the 75th passages was only 5·1 days from the injection to the death of the animal.

When the technique was well established all the mice inoculated intracerebrally became infected, no normal mouse having been found to be immune, although several hundred have been tested. After repeated passages the virus became so virulent that very minute doses were sufficient to produce infection.

Mice were also successfully infected by intraocular, and intraspinal injections of the virus and in all cases showed the pathological picture of those infected intracerebrally. When adult mice were inoculated intraperitoneally as a rule they remained well, but in about two-thirds of the cases became immune to an intracerebral injection; similar results were also obtained by intradermal, intramuscular and intratesticular injections. Young mice, from birth up to about 14 days old, were found to be susceptible to intraperitoneal inoculations of the virus, especially in later experiments. In all cases the symptoms were the same as those after intracerebral infection.

The first sign of illness in infected mice is generally a roughening of the fur and a loss of activity. The following day the mouse is usually very ill, often showing paralysis of the hindlegs, and death occurs that day or the next. At autopsy no constant macroscopic changes can be observed but haemorrhage of the stomach is common enough to suggest that it may be due to the virus. The only sure means of diagnosis is the examination of brain sections, which invariably show an encephalitis and nuclear changes in the ganglion cells resembling the inclusions found in the liver cells of monkeys infected with yellow fever.

From a study of the distribution of the virus in mice it is evidently highly neurotropic in these animals, for it never occurs in the blood and even when inoculated intraperitoneally the virus soon disappears from all the abdominal organs except the adrenal. No matter what method of inoculation was employed, the virus became strictly localized to the nervous system and adrenals. The study of the spinal cord and sciatic nerves of mice inoculated intracerebrally shows that the virus travels centrifugally along the nervous system. Thus the spinal cord is infective three days after the inoculation, whilst the sciatic and adrenal are uninfected; later at the fifth and sixth days the virus is present in large quantities throughout the whole nervous system including the sciatic nerve and adrenal. The passage of yellow fever virus through mice seems to lead to a loss of virulence for monkeys as determined by three experiments. One rhesus monkey inoculated with the virus from three mice at the third passage, 24 days after it had been established in these animals, was dying of yellow fever on the fifth day, and on autopsy showed typical lesions. A second monkey was inoculated with virus at the 29th passage, showed a rise in temperature on the 5th and 6th days, and was found to be immune against a subsequent dose of virus. A third monkey inoculated with material from the 42nd passage in mice, died after 48 days but without any definite symptoms of yellow fever.

The virus in infective mouse brains was found to retain its virulence for at least 160 days at -8°C . Also brains stored in 50 per cent. glycerine at a temperature of 2° – 4°C . were still virulent after 58 days, but not after 100 days. A brain kept in saline at 2° – 4°C . for 53 days proved just as infective as the glycerinated one, and also had ceased to be infective after 100 days.

The injection of immune serum either intraperitoneally or intracerebrally only exceptionally protected mice against a subsequent inoculation of virus whether given immediately after the serum or after an interval of 1 to 11 days. The intraperitoneal inoculation of virus produced immunity in about two-thirds of the mice, and in addition the intracerebral inoculation of sublethal doses occasionally produced immunity.

Immune monkey serum was mixed with mouse virus and the mixture inoculated intracerebrally into mice; of 10 mice 2 died and 8 were protected, whilst 12 control mice inoculated with a mixture of normal serum and virus all died. Similar results were obtained by the use of human immune serum, one of which was that of a laboratory worker who acquired the infection in the laboratory apparently from the mouse virus in about the 32nd passage.

The neurotropic character of this virus in mice, as well as the pathological changes induced, afford strong evidence that the aetiological agent of yellow fever belongs to the group of filterable viruses.

PETTIT (Auguste), ROUBAUD (Emile) & STÉFANOPOULO (Georges).
Fièvre jaune du singe consécutive aux piqures par stégomies de
Tunisie, de Java et de Cuba. [**The Production of Yellow Fever in
Monkeys by the Bites of Stegomyia from Tunis, Java and Cuba.**]—
C.R. Soc. Biol. 1930. May 9. Vol. 104. No. 15. pp. 60–63.
[4 refs.]

The authors give the results of transmission experiments with three strains of *Aedes aegypti* from Tunis, Java and Cuba respectively. A fatal infection was produced in a rhesus monkey by the bites of two of the Tunis strain mosquitoes that had fed on a yellow fever monkey 13 to 20 days previously.

With a Javan strain of mosquitoes that had fed on an infected monkey, a normal monkey, bitten by six insects after an interval of 12 to 13 days, showed no signs of infection, and was shown to be non-immune by a subsequent injection of virus to which it succumbed in six days. A second monkey bitten by 10 mosquitoes of the same batch, after a longer incubation period of 17 to 18 days, seems to have had a non-apparent infection, for when subsequently inoculated with yellow fever virus it was immune. With a Cuban strain of mosquitoes that had also been maintained in Dakar, West Africa, two monkeys were bitten by mosquitoes that had previously fed on the same infected monkeys used in the preceding experiment. One of these monkeys was unaffected and 40 days later was inoculated with yellow fever virus and died from the infection; the other, although showing no signs of disease, seemed to have had a benign attack, for it was subsequently found to be immune against yellow fever.

E. H.

DAVIS (Nelson C.). **The Transmission of Yellow Fever. Experiments with the "Woolly Monkey"** (*Lagothrix lagotricha* Humboldt), the "Spider Monkey" (*Ateles* [*Ateles*] *ater* F. Cuvier), and the "Squirrel Monkey" (*Saimiri sciureus* [*sciureus*] Linnaeus).—*Jl. Experim. Med.* 1930. May 1. Vol. 51. No. 5. pp. 703–720. With 3 charts in text & 2 figs. on 1 plate. [5 refs.] [Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

An independent confirmation of KUCZYNSKI's observation that the squirrel monkey *Saimiri sciureus* is susceptible to infection with yellow fever [see this *Bulletin*, ante, p. 87]. Particulars are given of the various methods of infection, and the maintenance of the virus through four direct passages in *Saimiri*. Some of the monkeys died of the disease and showed lesions, including liver necrosis, suggesting yellow fever as seen in human beings and *rhesus* monkeys.

In addition the spider monkey, *Ateles ater*, was infected by the bites of mosquitoes and the inoculation of infected blood or liver. Although virus was recovered from these animals the livers showed no signs of necrosis. 3 cc. of the serum of a recovered monkey protected a *rhesus* against infection. In addition, three out of twelve "woolly monkeys," *Lagothrix lagotricha*, showed a rise in temperature after being inoculated with yellow fever virus, but in only one instance was the virus trans-

ferred back to *M. rhesus*. Protection tests were made with sera from four of the monkeys; the sera of three that had been injected with infected blood all protected, whilst in the case of one that had been bitten by infected mosquitoes, but showed no reaction, its serum had no protective action.

E. H.

BAUER (Johannes H.) & MAHAFFY (Alexander F.). **The Susceptibility of African Monkeys to Yellow Fever.**—*Amer. J. Hyg.* 1930. July. Vol. 12. No. 1. pp. 155–174. [2 refs.] [Labs of the West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

Attempts were made to infect four species of African monkeys, viz. *Cercopithecus tantalus*, *C. mona*, *Cercocebus torquatus*, and *Erythrocebus patas*, with yellow fever, both by the inoculation of infected blood, and the bites of infected mosquitoes. Although none of the animals showed any clinical signs of infection, the virus was found to persist in the blood for a few days in the case of all except *Cercopithecus mona* as determined by the injection of the blood into normal *rhesus*.

In addition, normal *Aedes aegypti* were fed on these monkeys and the mosquitoes which fed on *Cercopithecus tantalus* and *Cercocebus torquatus* within a few days of being injected with virus, were found to become infected and capable of transmitting the infection to susceptible *rhesus* monkeys. Experiments with *Erythrocebus patas* gave results suggestive of the mosquitoes having become infected, but since no fatal infection was produced by them, the results are not quite definite. Protection tests were made with the sera of four *Cercopithecus tantalus*, two *Cercocebus torquatus* and one *Erythrocebus patas* after these animals had been exposed to experimental infection. In every case the serum was found to have acquired protective properties, injections of 5 cc. protecting *rhesus* monkeys against large doses of the virus. The sera of five of these monkeys were tested before the experiment, and in every case had no protective properties. [On p. 169, September 18th, 1929 is presumably a misprint for September 8th.]

E. H.

PETTIT (Auguste) & STÉFANOPOULO (Georges). **Fièvre jaune chez un singe du nord-africain, *Macacus inuus* L.** [**Yellow Fever in a North African Monkey, *Macacus inuus* L.**—*C.R. Soc. Biol.* 1930. May 9. Vol. 104. No. 15. pp. 63–65. [1 ref.]

A record of the infection of 3 *Macacus inuus*, by the inoculation of yellow fever virus. One animal died after 5 days and the other two after 4 days with typical symptoms of yellow fever, the pathological changes resembling those in *M. rhesus*. [It is interesting to note that during one of the yellow fever epidemics at Gibraltar, in 1828, the local monkeys, which belong to this species, are said to have died off in large numbers.]

E. H.

WAKEMAN (A. Maurice) & MORRELL (Clare A.). **Chemistry and Metabolism in Experimental Yellow Fever in *Macacus rhesus* Monkeys. I. Concentration of Nonprotein Nitrogenous Constituents in the Blood.**—*Arch. Intern. Med.* 1930. Aug. Vol. 46. No. 2. pp. 290–305. [29 refs.] [Lab. of West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

The authors have studied various chemical changes accompanying yellow fever in monkeys. In common with previous observers they find extremely low blood sugar values, e.g., 14 to 28 mgm. per 100 cc. at the end of the infection. Blood creatinine was slightly increased during the course of the disease and there was also an increase in the absolute amount of urea nitrogen, although when calculated as a percentage of the total non-protein nitrogen there was a decrease. It is interesting, in view of the extreme necrosis of the liver in yellow fever, that there was no significant change in the uric acid concentration of the blood, for the removal of the liver in dogs and rabbits has been found to cause a rise in the uric acid content of the blood. The amino-acid nitrogen was found to rise rapidly in the terminal stages of the disease, and showed large gains both in absolute amounts and in relation to the total non-protein nitrogen. The absolute concentration of rest nitrogen was also increased. The functional derangement of the liver is evidenced by its loss of power to deaminize amino-acids and to produce urea, but this change becomes apparent only during the last hours of life.

The rapid terminal rise of blood non-protein nitrogen is considered to be due to failure of the renal function. The decrease in both urine volume and excretion of nitrogen may be associated with the fall of blood pressure usually occurring before death. In three monkeys tested by a manometer in the femoral artery the pressure fell from a normal of approximately 120 mm. of mercury systolic and 60 mm. diastolic, to as low as 50 to 60 systolic and 40 to 50 diastolic.

E. H.

VELLARD (J.) & VIANNA (M. Miguelote). **Modificações da coagulação sanguínea no decurso da febre amarela experimental no *Macacus rhesus*. [Modifications of Coagulability of the Blood in Experimental Yellow Fever in *Macacus rhesus*.]**—*Med. Inst. Oswaldo Cruz.* 1930. Vol. 23. No. 4. pp. 173–177. [2 refs.]

Sixteen rhesus monkeys were divided into three groups. Ten were inoculated with virulent blood from other rhesus, 3 were bitten by mosquitoes infected from man or rhesus, and 3 were inoculated with emulsions of infected mosquitoes. 5–10 cc. of blood were taken by cardiopuncture on successive days when the fever appeared. The serum showed no change of coagulability, so that of the plasma was studied. In no case was complete incoagulability observed, nor so small an amount of antithrombin as would definitely impede coagulation of a normal serum *in vitro*. Generally speaking, the diminution of coagulability varied with the degree of haemorrhage in this disease, but being only slight in non-fatal cases affords a good prognostic sign in monkeys. It is not applicable to man in whom the coagulability is disturbed in all cases from the onset of the fever.

H. H. S.

- i. MANTEUFEL (Paul) & HERZBERG (Kurt). Identität des *Bacillus hepatodystrophicans* (Kuczynski 1929) mit dem *Bacterium renale cuniculi* (Manteufel und Herzberg 1929). [**The Identity of *Bacillus hepatodystrophicans* (Kuczynski 1929) with *Bacterium renale cuniculi* (Manteufel and Herzberg 1929).**—*Zent. f. Bakt.* I. Abt. Orig. 1930. June 3. Vol. 117. No. 1/3. pp. 16–18. [3 refs.] [Med. Acad., Dusseldorf.]
- ii. KUCZYNSKI (Max H.) & HOHENADEL (B.). Bemerkungen zu der Arbeit von Manteufel und Herzberg: "Identität des *Bacillus hepatodystrophicans* usw." [Dieses Zbl. Abt. I Orig. 117, 16 (1930).] [**Remarks on the Work of Manteufel and Herzberg.**—*Ibid.* July 28. Vol. 117. No. 7/8. pp. 499–500.

i. The authors have compared two strains of *B. hepatodystrophicans* (Nos. 312 and 1596) received from Professor KUCZYNSKI, with *Bacterium renale cuniculi*, an organism which is often present in the kidneys of apparently healthy normal rabbits. The results of cultural and agglutination tests indicate that the two are identical, and it would seem that KUCZYNSKI's yellow fever bacillus was derived from the rabbit's kidney used in making his culture media. When using culture media containing fresh tissue, it is evident that very great caution has to be used, for Manteufel and Herzberg obtained growth of *B. renale cuniculi* in media containing normal rabbit's kidney, that showed no signs of being infected until after 20 days' incubation period.

ii. In their reply the authors state that they have examined approximately 300 rabbits during the past two years, and as a general rule no bacterial infection was found in their organs. Moreover, the best results were obtained by the use of the heart or liver of monkeys infected with yellow fever, rabbit tissue never having been introduced into these culture tubes. Finally, attention is called to the results of their experiments which form the basis of the aetiological nature of *B. hepatodystrophicans*.

E. H.

MONTEIRO (J. Lemos). Nouvelle technique pour la préparation du vaccin contre la fièvre jaune. [**A New Method for the Preparation of Yellow Fever Vaccine.**—*C.R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 695–697. [Butantan Inst., Butantan.]

The method of preparing this vaccine, in which the virus is inactivated by chloroform, was described in a previous publication [*ante*, p. 493]. The present article, in addition to giving details of the technique, contains particulars of two rhesus monkeys which were inoculated with this vaccine 24 hours and 3 days after its preparation. Three months later both were tested and found to be immune against yellow fever.

E. H.

OKELL (C. C.). **Experiments with Yellow Fever Vaccine in Monkeys.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Aug. 8. Vol. 24. No. 2. pp. 251–254. [4 refs.]

A record of experiments with yellow fever vaccines prepared in accordance with ARAGÃO's modification of HINDLE's technique, 0.5 per cent. phenol and 0.02 per cent. formaldehyde being used to inactivate

the virus. Owing to the uncertain lethality of the virus it was impossible to prove conclusively that the vaccine protected the monkeys against yellow fever, but in the case of vaccines less than a month old there was a strong probability (0.9936) that they conferred protection, and in those more than a month old there was fairly conclusive evidence that they failed to protect. The virus employed was the French strain, used in HINDLE's experiments, and there is evidence of its diminution in virulence, for whereas HINDLE [this *Bulletin*, Vol. 26, p. 292] found that out of 60 monkeys inoculated with the virus all except one died of yellow fever, in the present series of experiments, out of 38 normal monkeys, only 21 died apparently from yellow fever and 17 recovered. This diminution in virulence is considered to be a likely cause of the failure to produce more adequate confirmation of previous observations as to the protective value of this vaccine, and, as the author remarks, unless a virus can be obtained which kills approximately 100 per cent. of monkeys, prophylactic effects can only be based on tests in which vaccinated and control animals are sufficiently numerous for the mortality figures of the two groups to be amenable to statistical analysis. None of the monkeys inoculated with the vaccine showed any indisposition that could be ascribed to this treatment.

E. H.

MONTEIRO (J. Lemos) & TRAVASSOS (J.). Diagnostico serologico da febre amarella. Sobre a reacção de fixação do complemento na febre amarella, seus resultados e valor pratico. [**Serological Diagnosis of Yellow Fever. Fixation of Complement, its Results and Value in Practice.**]—*Brasil-Medico*. 1930. Mar. 15. Vol. 44. No. 11. pp. 313–318. With 1 text fig. [2 refs.]

— & —. Diagnostic sérologique de la fièvre jaune. A propos de la réaction de fixation du complément dans la fièvre jaune : ses résultats et sa valeur pratique.—*C. R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 697–700. [1 ref.]

The authors describe their method of carrying out the complement fixation test for yellow fever.

As antigen they use the liver of an infected *M. rhesus* killed soon after the fall in temperature. The tissue is cut in small pieces, repeatedly washed in saline, then triturated with sand. To each gram of liver tissue 1 cc. of 10 per cent. NaCl is added, the whole placed in the cold for 24 hours in a sterile flask containing glass beads. The concentration of the saline is then reduced to 0.85 per cent., the product is thoroughly shaken for an hour, centrifuged or filtered and the filtrate distributed in sterile ampoules after testing for bacterial sterility. For the test 0.2 cc. of the serum and 0.2 cc. of the antigen are used with graded amounts of complement, the whole made up to 1.5 cc. and placed in a waterbath at 37°–38° C. for 1½ hours. The second part of the reaction is carried out in the usual way.

Tests were made : (1) With sera from yellow fever cases and convalescents ; excluding those which were anticomplementary, there were 11, and of these 9 were positive, 2 negative. (2) With sera of 25 infected *rhesus* ; 95.8 per cent. were positive after the fourth day of illness, and the intensity increased from the sixth to the tenth day. (3) Sera of patients suffering from typhoid and other febrile conditions, such as typhus and syphilis ; of these 14.5 per cent. were positive. In explanation of this it is stated that they were persons who had lived in an

infected area. (4) Individuals apparently in good health living in yellow fever districts ; of these 30 per cent. were positive. (5) Lastly, sera of 20 foreigners, recent arrivals in the country ; these were all negative. The test may thus be useful in determining among the inhabitants of an infected district those susceptible to infection and those who have acquired immunity.

It may be mentioned that the serum of patients or convalescents, when added to the antigen in equal quantities, gave a precipitation ; with less antigen or with normal serum no such reaction appeared.

H. H. S.

ARAGÃO (Henrique de Beaurepaire). Transmissão da febre amarella pelos mosquitos.—*Brasil-Medico*. 1929. Dec. 7. Vol. 43. No. 49. pp. 1481-1484. [1 ref.]

JORGE (Ricardo). La fièvre jaune et la campagne sanitaire à Rio de Janeiro (1928-1929).—*Bull. Office Internat. d'Hyg. Publique*. 1930. Mar. Vol. 22. No. 3. pp. 477-501. With 2 diagrams. [1 ref.]

MONTEIRO (J. Lemos). Recherches de microorganismes dans le sang de *Macacus rhesus* infectés avec le virus amaril.—*C. R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 701-703. [2 refs.]

RÉGIS (L. J.). Les idées actuelles sur la fièvre jaune.—*Rev. Prat. Malad. des Pays Chauds*. 1930. Jan. Vol. 10. No. 1. pp. 9-10, 13-17.

MEDICAL ZOOLOGY.

- i. BLACKLOCK (D. B.), GORDON (R. M.) & FINE (J.) with a Bacteriological Investigation by WATSON (Marion). **Metazoan Immunity: a Report on Recent Investigations.**—*Ann. Trop. Med. & Parasit.* 1930. Apr. 7. Vol. 24. No. 1. pp. 5-54. With 7 text figs. & 3 graphs. [9 refs.] [Sir Alfred Lewis Jones Research Lab., Freetown, Sierra Leone.]
- ii. WATSON (Marion). **Bacteriological Investigation on *Cordylobia anthropophaga* in Relation to the Immunity produced by it.**—*Ibid.* pp. 55-67. [3 refs.]

i. In two earlier papers (1927; see this *Bulletin*, Vol. 24, p. 861, and Vol. 25, p. 252) the authors in Sierra Leone showed how in guineapigs, after previous experimental infection with the parasitic maggot of the tumbu fly (*Cordylobia anthropophaga*), the plot of skin invaded by the maggot acquires an immunity to a subsequent infection, this local skin-immunity tending to spread from the primary focus to neighbouring areas that have not been invaded by the maggot. They also observed that guineapigs of the local breed (which presumably had at times been attacked by the parasite) are much less susceptible to experimental infection than guineapigs imported from England. Furthermore, they obtained some success in the artificial production of immunity by allowing young *Cordylobia* larvae to pierce the skin and then removing them, and also by the application of emulsions of the larvae to the skin.

In the present paper the authors, after confirming the easy and certain development of this local skin-immunity following an invasion of the living parasite, describe the difficulty and uncertainty of producing it by injections of the dead parasite or by intracutaneous vaccinations of antigens prepared from its various tissues and juices. Of 40 animals (guineapigs and rats) submitted to such preventive treatment for terms of considerable length 23 survived for further experiment, and although many of these 23 showed a "relative immunity" (or lessened susceptibility) only 3 developed complete local immunity. Of these 3 animals, 1 received 230 first instar larvae in 5 injections in the course of 32 days; 1 received the ground-up cuticle of 42 third instar larvae in 6 injections in the course of 30 days; and 1 received 521 first instar larvae in 5 injections in the course of 28 days. This discrepancy between the certainly immunizing consequence of an invasion by the living larvae and the uncertain and exceptional vaccinating results of large quantities of dead larvae and of antigens prepared from dead larval tissues has stirred the authors to a careful and elaborate physiological study of the *Cordylobia* larva—of which the following is their own summary:—

" 1. Injections of whole first instar *Cordylobia anthropophaga* larvae and antigens prepared from the cuticle, salivary glands and gut of third instar larvae have only produced immunity in a few isolated instances and then only after the injection of relatively very large amounts of such antigens. The toxicity of these antigens and the development of immunity to such toxins has been studied.

" 2. The following enzymes have been found to occur in the third instar larva:—Amylase, invertase, maltase, trypsin, erepsin, lipase and tyrosinase; an account is given of their distribution and relative concentration.

" 3. Immune and non-immune guineapigs' sera were found to possess both amylase and lipase. In a few experiments the presence of an invertase accelerator was also demonstrated.

" 4. Neither immune nor non-immune animals showed any anti-enzyme to amylase, invertase, or lipase. Both immune and non-immune animals possessed to an equal extent anti-trypsin and anti-tyrosinase.

" 5. Injection of amylase, invertase, and lipase into guineapigs was not followed by the development of an anti-enzyme. Injection of tyrosinase (i.e., the haemocoel fluid of third instar larvae containing both tyrosinase and tyrosin) into guineapigs did not increase the already existing anti-tyrosinase.

" 6. Injection of trypsin into guineapigs was followed by the further development of anti-trypsin, but animals which had acquired this antibody possessed no immunity to *Cordylobia* larvae.

" 7. The power possessed by third instar larvae of resisting long periods of oxygen deprivation has been studied. We have reached the conclusion that this power is dependent on the enzyme tyrosinase present in the haemocoel fluid of the larva. Our experiments have confirmed and amplified the work of Barnes and Grove (1916).

" 8. Eosinophilia followed the injection of the haemocoel fluid or excreta of third instar larvae into guineapigs. A similar result did not follow the injection of whole first instar larvae, or of antigens prepared from the cuticle, salivary glands or gut of third instar larvae.

" 9. No precipitin in the serum of previously infected animals could be demonstrated to antigens composed of ground first instar larvae or of cuticle, salivary glands or gut of third instar larvae. The injection of large amounts of these antigens only rarely led to the development of a weak specific precipitin.

" 10. A precipitin has been shown to exist in the serum of previously infected animals to the haemocoel fluid and excreta of third instar larvae. No such precipitin was ever demonstrated in the serum of animals which had not been infected.

" 11. The death of the larva in the immune animal has been shown to be very closely associated with the reaction between the gut contents of the larva and the serum of the immune animal."

ii. This investigation opens an attempt to elicit what part, if any, is taken by bacteria in the production of the immunity to the attack of the *Cordylobia* larva observed in guineapigs as a consequence of repeated infection. In the case of both guineapigs and rats, it states the number of organisms isolated from their skins, the distribution of the organisms (identified and at present unidentified) among the normal and the immune animals; and also states the distribution of organisms isolated among ten new-hatched flies and among ten third instar *Cordylobia* larvae. The author's conclusions, so far, are as follows:—

" 1. That in the two groups of guineapig skins examined, the bacterial flora of the non-infected skins differed little from that of the immune skins, and further, that no one organism was constantly present and peculiar to one group or the other.

" 2. That the bacterial flora of the rat skins examined, although less varied than that of the guineapig skins, did not differ materially from the latter.

" 3. That the newly emerged *C. anthropophaga*, hatched under sterile conditions, contains organisms similar to those isolated from the intestinal tract of third instar larvae.

" 4. That third instar larvae of *C. anthropophaga* have intestinal tracts containing many bacteria, and that the organisms probably are derived largely from the skin or tissues of the host in which they have grown.

" 5. That the first instar larvae of *C. anthropophaga*, on emergence from the eggs, are sterile.

"6. That the interior of the eggs of *C. anthropophaga*, laid by flies which have been bred without any precautions to ensure sterility, is sterile."

A. Alcock.

SERGEANT (Edm.). De la prémunition. [On "**Premunition.**"]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 887-895. [Pasteur Inst. of Algeria, Algiers.]

Certain infectious diseases are not submissive to vaccination; such as tuberculosis, undulant fever, glanders, syphilis, malaria and maladies due to protozoa generally; and yet by their chronic persistence in a dormant state they give to the individual a protection from a fresh infection which resembles the immunity established by recovery from a disease that is tractable to vaccination. For this semblance of vaccinal immunity—lasting, however, only as long as the original infection continues latent—Ed. Sergent has coined the word "premunition," and for the living dormant virus in its protective rôle he uses the term "virus-vaccine." The state of "premunition" is exemplified in "old colonists, long-time carriers of the germs of malaria, who know that they do not run the same risk of a pernicious attack as the new-comer does," "Premunition," it is explained, corresponds with "relative immunity" of the Germans, "immunity-tolerance" of MESNIL, "partial immunity" of BORDET, and "labile immunity" of C. SCHILLING.

Can we imitate and artificially provide this "premunition"—so well exemplified in the latent malaria of the old colonist—against other infectious diseases not amenable to vaccination? Can we run all the risks of using for weal or woe a living natural virus as a vaccine—of damaging the individual, of broad-casting "carriers," of manufacturing "reservoirs"? The question for the medical man is humanitarian, for the veterinarian mainly economic. Where the virus can be cultivated its virulence may be mitigated in the course or modified circumstances of cultivation; in this way the B.C.G. premunitive "virus-vaccine" of CALMETTE & GUÉRIN has lost its virulence entirely. In the case of diseases due to Haematozoa their course may be aborted or suddenly mitigated by appropriate therapeutic treatment which does not actually sterilize the blood; in this way, in N. Africa, camels are "premunized" against trypanosomiasis by inoculating them with the specific trypanosome and then aborting the fever by an injection of an antimony or arsenic product. [If the B.C.G. vaccine should be embraced in the definition of "premunition" it would seem that the famous anthrax vaccine of PASTEUR should also be included.]

A. A.

EMILY (J.). Un centre d'études biologiques en Afrique occidentale française "Pastoria." [**Pastoria: a Centre of Biologic Studies in French West Africa.**]—*Presse Méd.* 1930. Mar. 5. Vol. 38. No. 19. pp. 323-325. With 6 text figs.

This is a general account of "Pastoria," the park and menagerie for apes and monkeys established about seven years ago in the island of Los, near Konakri, in French West Africa, mainly for the experimental study of certain communicable tropical diseases. The scheme of the institution originated, just before the War, with CALMETTE. It was

well supported by the Pasteur Institute of Paris and was liberally furthered by the French West African Government; but it could not be brought into reality until the end of 1922. The scientific objects and the happy organization of the institution have been described by CALMETTE himself (1924) in a paper entitled "Sur l'utilisation des singes en médecine expérimentale. Le Laboratoire Pasteur de Kindia (Guinée Française)" which was summarized in this *Bulletin* (Vol. 21, 1924, p. 672). The object of Emily's paper is to attract the attention of the general medical public to the existence of the institution and its staff and to the universal interest of some of its activities.

A. A.

KURAUCHI (K.). **The Wild Rodents of Inner Mongolia. Plague Studies 2.**—*Jl. Oriental Med.* 1930. May. Vol. 12. No. 5. [In Japanese. English summary pp. 46-47.] [Hyg. Inst., S. Manchurian Rly. Co., Dairen.]

A collection of 57,178 rodents and 37 specimens of a hedgehog, all named by Prof. MORI, of Keijo Medical College. Of rodents, the commonest by far is *Mus wagneri*; other Muridae are *Rattus decumanus* and *R. alexandrinus* (neither of them numerous), *Mus minutus*, *Apodemus agrarius*, *Cricetus fumatus* (a hamster), *Microtus* (vole), new species of *Meriones* and *Phodopus*; of Sciuridae, *Citellus mongolicus* and a new species of *sousliks*; of jerboas, *Alactaga mongolica*; of molerats, *Myospalax epsilanus*. Of 8,158 *sousliks* examined 36 were infected with plague.

A. A.

FAUST (Ernest Carroll). **A Study of the Intestinal Protozoa of a Representative Sampling of the Population of Wise County, South-western Virginia.**—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 371-384. With 4 text figs. [6 refs.] [Med. College, Tulane Univ., New Orleans.]

In exceptionally favourable circumstances for collection and examination of material the author examined specimens of faeces (the majority less than 24 hours old) of 460 individuals (95 per cent. White) of the native population of Wise county in Virginia. Three preparations were made from each sample. Of the 460 individuals, 43.9 per cent. were male and 56.1 female; 21.1 per cent. were between a month and 5 years; 51.5 between 6 and 15 years; 9.5 between 16 and 25 years; 8.4 between 26 and 35 years; and 9.5 were 36 years or more. Of the 460, no less than "55.9 per cent. were positive on the one-examination basis for at least one of the human intestinal protozoa. The respective percentages of positives for the entire group are as follows: *Entamoeba coli*, 26.1; *E. histolytica*, 20.0; *Endolimax nana*, 26.5; *Iodamoeba buetschlii*, 6.1; *Giardia*, 16.3; *Chilomastix*, 5.0; *Trichomonas*, 2.4." From the data elaborated and analysed, the following conclusions are established:—

That "with the exception of *Giardia*, which is primarily an infection of childhood, there is a definite increase in the percentage incidence of these protozoa from childhood to middle age, indicating an accumulation of these infections year by year and an essential lack of immunity to them. The pro-rating of these infections to a six-examination basis shows an intensive-

ness of infection in the Wise county area which is comparable only with that observed in surveys in tropical countries and in SVENSSON's mental asylum cases in Sweden. There appears to be no correlation between protozoan and *Ascaris* infections in the groups studied."

A. A.

GABALDON (Arnoldo). Nota sobre distribucion de protozoos intestinales basada en el examen de 2,000 muestras. [**The Distribution of Intestinal Protozoa as shown by Examination of Two Thousand Specimens of Faeces.**] Trabajo presentado como tesis a la Universidad Central de Venezuela para el Doctorado en Medicina.—44 pp. 1930. Tipografia Americana, Caracas-Venezuela. .

This was a thesis for the M.D. Venezuela. Smears from fresh stools (8–12 hours old) were examined in saline, or saline and eosin, or a solution of iodine. The stools, it must be explained, were brought by persons wishing to know whether they harboured parasites, and since more than one might be from the same individual, the record is based merely on samples, and not on individual subjects.

E. histolytica [no distinction between vegetative or cystic] was found in 8.9 per cent., most between 3 and 5 years, none under 1 year and only 3.3 per cent. of the positive over 40 years. It was present with *E. coli* 25 times. The latter alone in 9.4 per cent., and one fifth of those in young people between 6 and 20 years. *Iodamoeba bütschlii* in 4.6 per cent., most in those from 6–10 years, *Endolimax nana* in 4.8 per cent., *Chilomastix mesnili* in 7.5 per cent., *Giardia lamblia* in 9.4 per cent., nearly one third of the last in children below 2 years. *Balantidium coli* in 5 persons only, all between 21 and 40 years, 3 men and 2 women. [Tables are drawn up for each of these parasites to show the percentage distribution in age groups: these figures however have not been reproduced here in detail because in the majority the total number of occasions on which they were present would be less than a hundred, making percentage deductions misleading.]

H. H. S.

HAKKI (Ismail). Le parasitisme intestinal en Turquie. [**Intestinal Parasitism in Turkey.**]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 192–196.

This appears to be a supplement to a paper by the author (who is Professor of Parasitology in Constantinople) which was published in the *Annales de Parasitologie*, April 1st, 1928. Of 600 individuals (men, women and children) whose fresh stools were examined, 350 harboured intestinal parasites. The protozoa present, and their percentages, were *Entamoeba dysenteriae* (cysts) 3.8; other 4-nucleate amoeba-cysts, 8.2; *Giardia intestinalis*, 4.0; *Tetramitus mesnili*, 2.0; *Trichomonas hominis*, 2.5. Intestinal worms or their eggs were found in 348 cases, the genera represented being *Ascaris*, *Enterobius*, *Necator*, *Trichuris*, *Taenia (saginata)*, *Hymenolepis*, *Dipylidium*, and *Diphyllobothrium*; of the worm infestations 272 were of a single species, 50 were of two, 23 were of three, and 3 were of four species; eosinophilia was observed in 75 per cent. of these infestations.

A. A.

PAULSON (Moses) & ANDREWS (Justin). **The Incidence of Human Intestinal Protozoa in Duodenal Aspirates.**—*Jl. Amer. Med. Assoc.* 1930. June 28. Vol. 94. No. 26. pp. 2063-2065. [14 refs.] [Johns Hopkins Hosp. & School of Med., & School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Seventeen persons presenting no evidence of gastro-intestinal or hepatobiliary disease, but passing (collectively) in the faeces all the commoner forms of intestinal protozoa (*Endolimax*, *Entamoeba*, *Iodamoeba*, *Chilomastix*, *Embadomonas*, *Giardia*, *Trichomonas*) were subjected to duodenal drainage, by a process fully described, for the purpose of ascertaining what protozoa are to be found in the duodenum, upper jejunum, and possibly in the bile-ducts and gall bladder. The results showed that only *Giardia lamblia* lived in the duodenum; it alone occurred in the duodenal juice in all the cases (7), where it was found alone or in association in the faeces; in all the other (10) cases, where it was not found in the faeces, the duodenal juice was quite barren of protozoa. The authors conclude that the presence of *Giardia* in "duodenal aspirates" containing bile does not establish the proposition that it lives in the gall bladder.

A. A.

RATCLIFFE (Herbert L.). **A Method for obtaining a Breeding Stock of Rats Free from Intestinal Protozoa.**—Reprinted from *Science*. 1929. Sept. 20. Vol. 70. No. 1812. pp. 286-287. [3 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The method here described is the outcome of the author's observation that protozoa did not make their appearance in the intestines of young rats until the age of 20 to 25 days, when they began solid food. He therefore took 15 seventeen-days-old rats from their mothers, put them in a clean cage, fed them at first, for two days, willy-nilly, on warm solutions of milk-powder, and thereafter on a stock ration (whole-wheat flour 60, whole-milk powder 15, unpurified casein 15, butter 5, Ca carb. 2, Fe cit. 2, NaCl. 1, green stuff, and water) with an eye to maintaining a stock free from intestinal protozoa. Of 11 that survived weaning 5 were killed when 4 weeks old, and 6 when 8 weeks old; protozoa were not found in intestines and caecum of any. The experiment was repeated with 8 young rats, all of which were killed at 8 weeks, with the same result. It was repeated again with 8, including 5 females; and at the age of 12 weeks material taken from the caecum of each was apparently not infected. They lived on and bred, and half the young from the first litters were killed and examined when weaned—and "were found to be uninfected."

A. A.

CARPANO (M.). **Pluralité des virus dans les infections par hémoprotozoaires et valeur de l'immunité croisée dans la création de nouvelles espèces. [Plurality in the Virus of Haemoprotozoon Infections, and the Value of Cross Immunity in the making of New Species.]**—*Ann. Parasit. Humaine et Comparée*. 1930. Jan. 1. Vol. 8. No. 1. pp. 1-7. With 1 text fig.

In discussing the validity of "biological species," and the value of cross-immunity as an experimental basis, the author dwells on the

snare that beset them. On the one hand, there may be plurality in the virus, and there is variability in its virulence. On the other hand, in the individual animals there have to be considered amplitude of immunity, natural resistance (variable), and possibility of latent infections. As instances the author refers to certain strains of *Nuttallia equi*, *Babesia bovis*, and *Piroplasma bigeminum* fatal to animals that had acquired their respective immunity in a different locality.

A. A.

CLARK (Herbert C.) **A Preliminary Report on Some Parasites in the Blood of Wild Monkeys of Panama.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 25-32. With 5 plates. [6 refs.]

The author found malaria parasites in two kinds of Cebid monkeys captured in Panama during July—a species like *P. vivax* in red spider-monkeys (*Ateles geoffroyi*) and a species like *P. malariae* in capuchins (*Cebus capuchinus*). In both cases nearly all the infected individuals were "infants," or young, or pregnant females, and in both cases enlargement of the spleen and deep pigmentation of viscera was to be observed. Inoculations of an Old World monkey, *Macacus rhesus*, with the infected bloods gave no result—no parasites nor any signs of illness were observed within an observation term of six weeks.

Individuals both of *Ateles* and *Cebus*, as also of the Titi monkey (*Saimiri oerstedii*), were infected with microfilaria. *Cebus* and Titi monkeys, as also black howling monkeys (*Alouatta palliata*) were infected with trypanosomes, but their blood did not prove infective to guineapigs within a term of six weeks.

A. A.

GLASER (R. W.) & CORIA (N. A.). **Methods for the Pure Culture of Certain Protozoa.**—*Jl. Experim. Med.* 1930. May 1. Vol. 51. No. 5. pp. 787-806. With 2 figs. on 1 plate. [14 refs.] [Rockefeller Inst. for Med. Research, Princeton, N.J.]

The artificial cultivation of protozoa is often hampered by growths of bacteria and yeasts; and the authors describe in detail their methods of "purifying" media from this kind of contamination—such as the use of dilute media poor in proteins. Or, where two species develop from the same inoculum, they may be separated by further dilution and washing, taking advantage of a negative geotropism that brings protozoa to the surface. Or, again, where a species cannot be purified from bacteria by other methods, chemical sterilization can be employed. Among other (identified and unidentified) species successfully purified was *Paramecium caudatum*, but it failed to develop subsequently since it feeds on living micro-organisms. The paper cannot be further abstracted, since it consists chiefly of descriptive technique.

A. A.

FAUST (Ernest Carroll). **Experiments on the Effect of Di-Hydranol on Intestinal Protozoa of Man and Laboratory Mammals.**—*Proc. Soc. Experim. Biol. & Med.* 1930. June. Vol. 27. No. 9. pp. 905-907. [4 refs.] [Dept. of Trop. Med., Tulane Univ., New Orleans.]

The author records experiments with di-hydranol (2-4 dihydroxyl-phenyl n-heptane) in the treatment of intestinal infestations of protozoa in 21 human cases and 13 animals. "In 19 cases of *E. histolytica* including 2 acute infections (dogs), 1 chronic case of 5 years' standing and refractory to other drugs (adult), 2 chronic children, and 14 carrier cases, all except one carrier case have been freed of the infection with a single course of treatment (4 to 10 gm.).

Two of the 12 *E. coli* infections have been eliminated. The 2 *Iodamoeba* and 2 *Endolimax nana* infections have been removed. The 2 *Trichomonas* infections (monkeys) have been eliminated. One of the 3 *Chilomastix* [monkeys] and 4 of the 14 *Giardia* cases (2 human, 2 canine) have been eliminated. The rest were completely freed of their *Giardia* infection on the third day of treatment, but gradually showed *Giardia* cysts in their stools"—a possible re-infection from their cages. The results suggest that di-hydranol has a specific effect on *E. histolytica*, *E. nana*, *Iodamoeba*, and *Trichomonas*, but is less punitive to tough-walled cysts.

The course of treatment lasts for 7 days (or more), to a total of 4 to 10 gm. of the drug. Children get 0.2 gm. three times a day in a teaspoon of olive oil, for 7 days; adults two capsules each containing 0.3 gm. two or three times a day, after meals. The drug was well borne, except for slight gastric pain in two children to whom it had been given before meals, and for slight diarrhoea in the case of two adults.

A. A.

RATCLIFFE (Herbert L.). **The Oral Administration of Certain Alkyl Resorcinols and their Effects upon the Intestinal Protozoa and Bacteria of Rats and upon Intestinal Protozoa in Chicks.**—*Amer. J. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 643-654. [9 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

One per cent. of, respectively, butyl-, hexyl-, heptyl-, and octyl-resorcinol was added to the diet of certain groups of rats (the diet being one that normally excites a predominance of *Lactobacillus*). All the rats were infested with *Trichomonas muris*, *T. parva*, and *Entamoeba muris*. At the end of 15 days *T. muris* and *Ent. muris* were "absent in all cases," and Gram-positive bacteria were "practically absent" and Gram-negative predominant in the material from the caeca. (By butyl- and hexyl-resorcinol *T. parva* had been reduced only to about 10 per cent. of the original number, though the other two resorcinol derivatives appear to have been completely effective against *T. parva* in 4 cases). Two groups of chicks, infested respectively with *Trichomonas gallinarum* and *T. hominis* were completely freed from these organisms in five days by a diet containing 1 per cent. of heptyl-resorcinol. The experiments were adequately controlled throughout.

A. A.

CLEVELAND (L. R.) & SANDERS (Elizabeth P.). **Encystation, Multiple Fission without Encystment, Excystation, Metacystic Development, and Variation in a Pure Line and Nine Strains of *Entamoeba histolytica*.**—*Arch. f. Protistenk.* 1930. Vol. 70. No. 2. pp. 223-266. With 8 text figs. & 114 figs. on plates 7 to 13. [28 refs.] [Med. School, Harvard Univ., Boston.]

The complete text and the illustrations of this paper must be studied. From 8 cases of acute dysentery in Boston, and from one carrier, 9 strains of *Entamoeba histolytica* were isolated for the basis of this study. The cultivation of these 9 strains was studied in Boeck-Drbohlav and other modified media. That this and other good modifications sometimes came short of expectations was due to the concurrent growth of bacteria. The supreme modification, in which all the strains grew well, was found to be autoclaved slants of liver-infusion agar (prepared

by the Digestive Ferments Company, Detroit, Michigan) covered with horse-serum in saline (1-6) with a 3 mm. loop of sterile rice-flour added to each tube. In it "the amoebae become as numerous as blood-cells are in the blood-stream. It is impossible to convey to the reader just how abundantly the amoebae grow in this medium." So well do they grow that there is no difficulty in establishing a clone or pure line of progeny descended from a single cyst. "Most of the illustrations [of this study] are pure line, and every amoeba that has been drawn has been seen in the pure line." The virulence of the pure line was found to be about the same for kittens as other strains of corresponding length of culture; it was tested by inoculations both per rectum and into the liver.

Variations in size of pure line cysts and amoebae and in the structure of the pure line nucleus are described. In the nuclei variations occur from the typical *histolytica* nucleus to what KOFOID and SWEZY have described as "*Councilmania dissimilis*" and "*Karyamoebina falcata*." "When the amoebae are fixed in Schaudinn's fluid at 37°C. perhaps not more than 1 to 2 per cent. of them have anything but *histolytica* nuclei. But when this same fixative [is used] at 60°C., . . . 5 to 10 per cent. have typical '*Councilmania dissimilis*' nuclei, and from 1 to 5 per cent. have typical '*Karyamoebina falcata*' nuclei; from 5 to 10 per cent. have fairly typical *histolytica* nuclei, and the remainder, or from 60 to 80 per cent., have nuclei intermediate between *E. histolytica* on one hand, and '*Councilmania dissimilis*' and '*Karyamoebina falcata*' on the other." Schaudinn's fluid heated to 60°C. is, as the authors state, the fixative used by KOFOID and SWEZY in the production of "*Councilmania*" and "*Karyamoebina*." These facts lead the authors to approve WENYON's suggestion that "*Councilmania lafleuri*" may very well be a non-typical *E. coli*; to suggest, furthermore, that "*Councilmania tenuis*" is probably a race of *E. histolytica* poor in chromatin; and to conclude that "*Councilmania*" and "*Karyamoebina*" are not valid.

In the study of encystation, excystation, and metacyclic development, the authors' observations agree very closely with those of DOBELL (see this *Bulletin*, Vol. 26, pp. 795, 796). In addition to 4-nucleate cysts 8-nucleate cysts sometimes (about 1 per cent.) occur in cultures—they are the product of binucleate amoebae. The authors have observed multiple fission of motile amoebae without encystment—everything goes on as in encystment except the formation of a cyst wall. They have also observed the ingestion and also stages of digestion of cysts ("cannibalism") by active amoebae. Having been able to grow countless millions of amoebae and to make permanent preparations "perhaps a hundred times as rich in amoebae as preparations from faecal smears" they have had good opportunities of studying mitosis, and their observations of the process agree very closely with those of DOBELL.

A. A.

HINDLE (Edward). **Attempts to infect Hamsters with Various Flagellates.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. June 30. Vol. 24. No. 1. pp. 97-104. [16 refs.] [Wellcome Bureau of Scientific Research, London.]

This is a careful and critical paper, and to be appreciated must be read in full. Its recorded "experiments with hamsters, animals

peculiarly susceptible to infection with leishmania, support the generally accepted view that ordinary insect flagellates do not survive in vertebrates, unless they represent a stage in the development of a vertebrate parasite"; and its other records do not countenance the theory that lizards may serve as reservoirs of leishmaniasis of man.

The author started with a sub-culture-variation of the flagellate stage of Chinese kala azar. (The original strain was stated to have been normal when isolated, but to have undergone modification in the course of subculture). Of 12 hamsters inoculated *in peritoneo* with a rich suspension of these modified culture-flagellates only one became infected—and this mildly, and after a second inoculation at an interval of six months.

Subsequently 11 hamsters were inoculated with cultures of a Leishmania from the blood of a gecko lizard; 6 with cultures of a flagellate from the blood of an agamid lizard; 6 with cultures of *Herpetomonas culicidarum* (from two different sources); and 6 with a species of *Leptomonas* straight from the crop and midgut of a large Pentatomid bug. In not one instance did any evidence of infection follow.

A. A.

VAN GOOR (J. M. Noothoven). Bijdrage tot het vraagstuk der betekenis van *Lambliia intestinalis* voor de menschelijke pathologie. [*Lambliia intestinalis* and its Importance in Human Pathology.]—*Nederl. Tijdschr. v. Geneesk.* 1929. Nov. 30. Year 73. 2nd Half. No. 48. pp. 5557–5568. With 3 figs. on 1 plate. [32 refs.]

A discussion on six cases showing the cholecystoduodenal syndrome with the presence of *Giardia* in faeces and in the duodenal bile tube. Although there was an increase of *Giardia* in the bladder bile after introduction of $MgSO_4$ or after injection of pituitary extract, the bile never contained inflammatory products and sections of an excised gallbladder did not show any pathological changes.

A review of the literature shows that only in two cases was *Giardia* actually demonstrated in sections of gallbladder, and in the one case of Westphal no pathological changes could be shown in the gallbladder wall. The author therefore doubts whether *Giardia* ever causes morbid changes in the biliary tract and he thinks that the mere increase of this flagellate in the bladder bile should not sanction cholecystectomy. This increase when occurring after injection of pituitrin can be explained as being brought about by the stimulating effect of the hormone on duodenal peristalsis and the consequent ejection of the flagellates into the duodenal lumen. The author also states that there is no evidence in literature of pathological changes in the duodenum produced by *Giardia*.

H. Lwow.

MORENAS (L.). La giardiose des voies biliaires. Étude critique. [*Giardiasis of the Biliary Tract. A Critical Study.*]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 201–214. [36 refs.]

A historical account and bibliography of giardiasis of the bile-tract. The author's conclusions are that the invasion of the bile-tract by *Giardia* is a well-established fact, and that it is possible that such invasions on a large scale may provoke reflex irritation simulating various pathological

states and may even predispose the bile-ducts and gall-bladder to chronic infections. Furthermore, the invasion of the gall-bladder by *Giardia* is an established fact; but it probably is fortuitous and transient; at any rate the gall-bladder cannot be regarded as a "reservoir of the virus," nor has the occurrence of cholecystitis directly due to *Giardia* been proved.

A. A.

DONAYRE (Alberto). Algunas manifestaciones clínicas de sede digestiva producidas por el tricomonas. [**Digestive Disturbances associated with *Trichomonas* Infection.**—*Crónica Méd.* Lima. 1930. Mar. Vol. 47. No. 801. pp. 57-68. [9 refs.]

Six cases of trichomonas infestation are described, some resembling dysentery, others appendicitis. ESCOMEL's treatment by turpentine orally and iodine per rectum was entirely effective in all. [One of those with the appendicular syndrome may have been a case of catarrhal inflammation.]

H. H. S.

RATCLIFFE (Herbert L.). **The Comparative Adaptability of *Trichomonas muris* and *Trichomonas parva* to Culture Media and to Changes in the Intestinal Flora of Rats.**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 63-77. [10 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Three species of *Trichomonas* have been described from laboratory rats, namely, *T. muris*, *T. minuta*, and *T. parva*. "But some doubt has been expressed as to the existence of more than one species (Wenyon 1926)." On the ground that *T. muris* has not developed in cultures where *T. parva* grows readily, and is quickly affected by changes in the intestinal flora by which *T. parva* "is not influenced to any great extent," the author assumes "that *T. muris* is a much more specialized organism than *T. parva*" and is a species distinct. [KIPCHIDZÉ in his paper on the cultivation of *Trichomonas elongata* (*infra*) notices that the shape and longevity of this species in cultures varies with the quality of the medium.]

A. A.

RATCLIFFE (Herbert L.). **The Effects of Changes in the Diet and Intestinal Conditions of Rats upon Infections with *Trichomonas hominis* and *Pentatrichomonas ardinellei*.**—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 159-167. [6 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The aim of the experiments here described in all detail was to follow the connexion between certain intestinal flagellates and different types of intestinal bacteria. Having obtained rats believed to be trichomonad free the author infected 15 of them with *Trichomonas hominis* and 15 with *Pentatrichomonas ardinellei*. Ten of both lots of rats were then fed for three successive terms, each of two weeks, on a succession of three different diets; and five of both lots, as controls, were fed on only one of the diets unchanged all the time. At the intervals between the twenty days the contents of the caecums of the rats were examined. Infections with both species of trichomonads were constantly light in the rats kept on the unchanged diet—one that promoted growth of Gram-positive bacteria; with a diet promoting Gram-negative bacteria they decreased, probably from increased acidity of the caecum; and with a diet leading to an increase of proteolytic bacteria they decreased still further. All the diets used had a high protein content it is to be noted.

A. A.

KIPCHIDZÉ (N.). Recherches sur la culture de *Trichomonas elongata*. [On the Cultivation of *Trichomonas elongata*.]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 216-222. [5 refs.]

The *Trichomonas* found by the author and a collaborator in the mouth of *Macacus rhesus* and *Papio sphinx* is here stated to be identical with *T. elongata* from the human mouth. Various methods of cultivating the creature are here described; most of them have clotted horse-serum as a solid base and Ringer's solution or normal saline as a pallium, with perhaps some nutritive adjuvant. The medium affording the longest-lived culture (14 days) and the largest individuals is one having nutritive jelly as a base, and Ringer's or normal saline solution, with very finely powdered (sterilized) beef or fish-muscle and rice flour. The formulated detail of the paper cannot be abridged.

A. A.

BISHOP (Ann). The Action of Hydrochloric Acid upon Cultures of *Trichomonas*.—*Parasitology*. 1930. Mar. Vol. 22. No. 2. pp. 230-241. [21 refs.] [National Inst. for Med. Research, Hampstead, London.]

Prior work—specified in the bibliography—is briefly reviewed. Sources of material used for experiment are stated, namely: *a*, *Trichomonas* from human faeces; *b*, *Trichomonas* from *Macacus nemestrinus*; *c*, *Trichomonas* from *Macacus rhesus*. Experiments are described and discussed; they show that the *rhesus* strain was the most susceptible, being killed after five minutes exposure to N/20HCl at 37° C., and being slightly affected by distilled water: but that under the same conditions the human and the *nemestrinus* strains might survive the action of the dilute acid and always survived the exposure to distilled water. At room temperature the survival of the trichomonads was much longer than at 37° C. The trichomonads could not withstand drying.

A. A.

PEREKROPOFF (G. J.). Zur Frage des Einflusses der parasitischen Darmprotisten (*Tetrachilomastix intestinalis*) auf die Dickdarmkatarrhe des Menschen. [Influence of *T. intestinalis* on Colitis.]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 483-488. With 19 figs. on 1 plate. [7 refs.]

The flagellate, regarded by the author as the cause of colitis, is described and illustrated in a plate of nineteen figures, which, though poor, are sufficient to show that he was dealing with a *Trichomonas*, probably *T. hominis*, and not with "*Tetrachilomastix intestinalis*," the existence of which is problematical.

C. M. Wenyon.

NIESCHULZ (Otto) & WAWO-ROENTOE (F. K.). Infektionsversuche von Meerschweinchen mit *Trypanosoma lewisi*. [Experimental Infection of Guinea-pigs with *Trypanosoma lewisi*.]—*Ztschr. f. Parasitenk.* 1929. Oct. 12. Vol. 2. No. 2. pp. 294-296. [8 refs.] [Inst. for Infectious Diseases & Parasit., Utrecht.]

Detail of experimental infections of guinea-pigs with *Trypanosoma lewisi*. The trypanosomes multiplied at first and remained in evidence microscopically to the 13th day and by transmission to rats up to the 20th day, and then succumbed to the natural resistance of the guinea-pig. A mild infection was obtained up to 9 days in two passages through guinea-pigs. Infection was not enhanced by splenectomy.

A. A.

MISSIROLI (A.). Ricerche sui flagellati che si riscontrano nell' "Anopheles maculipennis." (**Researches on Flagellate Hosts in "Anopheles maculipennis."**)—*Riv. di Malariologia*. 1930. Mar.-Apr. Vol. 9. No. 2. pp. 111-119. With 17 figs. on 2 plates. [4 refs.] [English summary p. 205.]

In 16 of 700 specimens of *Anopheles maculipennis* (caught in the Roman Campagna (Fiumicino) and elsewhere) the author recently found flagellates—*Herpetomonas culicis* and Leishmania forms in the hindgut of 12, and Crithidia along with mammal blood in the midgut of 4. Sections showed some undergoing simple longitudinal fission, others appearing to undergo multiple (40 to sixty-fold) fission. The Crithidia is identified with that form of the sheep-trypanosome (*T. melophagum*).

H. H. S.

NICOLAEW (B. P.) & YAKOWLEWA (W. W.). Le sort formes sexuées du *Plasmodium vivax* dans la cavité abdominale des Culex, Theobaldia et Aedes. [**Fate of the Sexual Forms of Plasmodium vivax in the Abdominal Cavity of Culex, Theobaldia and Aedes.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 9. pp. 577-581. With 1 text fig. [In Russian. French summary pp. 581-582.] [Antimalaria Station, Leningrad.]

The authors fed culicine mosquitoes—*C. pipiens*, *T. alaskensis*, *Aedes salinellus*—on patients infected with *Plasmodium vivax*, and from time to time took smears of the individual stomach-contents and compared them with smears taken from anophelines—*A. maculipennis*—simultaneously fed upon the same patient. The resulting observations are as follows :—

The non-sexual forms of the Plasmodium were digested in the culicine as quickly as in the Anopheles. The sexual forms ripened, pairing was accomplished, and subsequent development proceeded as far as the vermicle stage, just as in Anopheles; but no penetration of the stomach-wall by the vermicle was observed.

A. A.

HUFF (Clay G.). **The Effects of Selection upon Susceptibility to Bird Malaria in Culex pipiens Linn.**—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 427-442. With 2 text figs. & 2 plates. [8 refs.] [Med. School, Harvard Univ., Boston.]

This is an experimental study in pure biology. The methods and technical detail are described, and the results are tabulated and debated. That the blood of birds used for feeding the mosquitoes should be grossly infected is the basis of the argument, and how fully this essential point is satisfied, is to be seen in a marvellous photograph of the stomach of a mosquito fed on a control bird. The following is the author's own summary :—

"Selection in *Culex pipiens* in respect to its susceptibility or non-susceptibility to *Plasmodium cathemerium* (an avian parasite) has brought strong evidence in favour of the existence of 'susceptible' and 'non-susceptible' races in this species. Selection of progenies from infected mothers caused the number of infected individuals in a particular line to

increase rapidly in percentage. Selection from uninfected mothers caused a rapid decrease in the percentage of infected individuals in such a line.

"It is believed that this proof weakens somewhat our conception that specificity is immutable. The proof that susceptibility and non-susceptibility behave as hereditary characters within a species, opens the question of whether a so-called susceptible species may not be capable of engendering a non-susceptible race, and conversely the question—even more important—of whether a so-called non-susceptible race may not be able to produce a susceptible race."

A. A.

SCHUURMAN (C. J.) & HUININK (A. M. Schuurman-Ten Bokkel).^{*} **Bird-Malaria.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 3. pp. 469–497. With 18 coloured figs. on 1 plate. [44 refs.] [Med. Lab., Weltevreden.]

This is a long study of *Plasmodium precox*, which, after a review of the history of the nomenclature, the authors accept as the name of the parasite of the bird-malaria of much classical research. It includes also a summary of the classical literature of the subject. In a search for the occurrence of the parasite 15 species of birds were examined, 11 of which were wild species. The parasite, *P. precox*, was found only in the canary, the weaver-bird (*Ploceus manjar*), and the Java lark (*Mirafra javanica*). (Halteridium occurred in 2 species of *Munia* besides the Java sparrow, Trypanosoma in another *Munia*, and Leucocytozoon in the hen, but none of these is further considered). *P. precox* is redescribed in much detail. Transmission experiments are described at length both by direct transmission from bird to bird and by indirect transmission through *Culex fatigans*. Besides the canary strain *C. fatigans* was found to be an appropriate carrier of the Java lark strain of the parasite, and in it the weaver-bird strain also developed sporozoites: but after a certain (limited) number of passages through birds of other than their own natural host-species the gametes of both the Java lark and the weaver-bird strains were unable to complete their sexual cycle in *C. fatigans* though their non-sexual forms retained their infective virulence for the alien bird-host. In the studies of the progress of infections in birds the influence of: (a) a concomitant Halteridium infection; (b) of reticulo-endothelial blockade; and (c) of vitamin B deficiency, was included—but inconclusively.

A. A.

SERGEANT (Edm.), SERGEANT (Et.) & CATANEI (A.). Paludisme des oiseaux. Etude de *Plasmodium rouxi* chez son hôte vertébré. [Study of *Plasmodium rouxi* in its Vertebrate Host.]—*Arch. Inst. Pasteur d'Algérie*. 1929. June. Vol. 7. No. 2. pp. 165–180. With 5 graphs & 1 plate. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

Plasmodium rouxi here described and figured is a parasite of Algerian sparrows. The young schizont (1 to 1.5 μ) is variable in shape, but as it grows becomes characteristically quadrangular with a nucleus at least half as big as the protoplasm, the latter containing but 2 granules of pigment. Schizogony results in the formation of 4 merozoites, which generally lie at the angles of the schizont, and a single granule of pigment. The young gametocytes are rather deficient in chromatin, they grow larger than the schizonts and then become elongated with one end rounded and the other end often notched or beaked (*souvent en bec de flûte*); the grains of pigment exceed two in number. *P. rouxi* never displaces or embraces the

nucleus of the red blood cell. It is intensely pathogenous to canaries, 15 of 50 canaries experimentally infected dying. The infection is characterized by a long incubation, a slow and prolonged invasion of the blood, and a chronic duration which may be protracted (with recurrent parasite-relapses) for years.

A. A.

ANDREWS (Justin). **Excystation of Coccidial Oocysts in Vivo.**—Reprinted from *Science*. 1930. Jan. 10. Vol. 71. No. 1828. p. 37. [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

"The author has repeatedly carried out excystation in vivo" of coccidia cysts from several species of mammals by the technique he describes. A young starved rat is fed on a few drops of a concentration of the ripe oocysts in sweetened milk. An hour afterwards the rat is killed and its intestine is removed. By search at the various points where the intestine is distended with the milk all phases in excystation can be found, if the oocysts were normal.

A. A.

BOUGHTON (Donald C.). **The Value of Measurements in the Study of a Protozoan Parasite *Isospora lacazei* (Labbé).**—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 212-226. [14 refs.] [Zool. Dept., Univ. of Minnesota, Minneapolis.]

The average size of the oocysts of the sparrow coccidian (*Isospora lacazei* Labbé) varies during an infection in an individual host. The variation "in general seems to progress through a period of about a month, from larger to medium to smaller mean sizes," including differences greater than those that have been used to differentiate coccidian species. "The observations can be explained by assuming that either the sparrows harbour several species or strains of the parasite or that some factor or group of factors brings about a considerable change in oocyst size." These alternatives are inconclusively discussed.

A. A.

SCHUMAKER (E.). **Experimental Infection of Rats with the *Balantidium* from the Pig.**—Reprinted from *Science*. 1929. Oct. 18. Vol. 70. No. 1816. p. 384. [8 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The author succeeded in infecting rats with *Balantidium* by injecting, either into the caecum of the laparotomized rat, or into the rat by stomach tube, either concentrated culture of *Balantidium* or strained material direct from the colon of the pig. In a sum total of 48 operations on rats 19 were successful. The sundry infections in rats lasted from 2 to 23 days, and were localized in the caecum. Attempts to infect four rats with *Balantidium*-cysts from a monkey, and other four rats with *Balantidium* from the guineapig did not succeed.

A. A.

FAUST (Ernest Carroll). **A Method for obtaining a Pure Culture of *Balantidium coli*.**—*Proc. Soc. Experim. Biol. & Med.* 1930. Apr. Vol. 27. No. 7. pp. 648-650. [3 refs.] [Dept. of Trop. Med., Tulane Univ. of Louisiana, New Orleans.]

By this method pure cultures are started on "various culture media" with balantidia that have been sterilized in weak solutions of agents—in particular acriviolet and neutral acriflavine—that kill the bacteria, but do not hurt the balantidia. In the process of sterilization the trophozoites are first freed from faecal and gross bacterial contamination, and at the

same time concentrated, "in a modified Ringer's fluid," and are then transferred first to a sterilizing 1/16,000 dilution of acriflavine (in which they remain active for 30 to 60 minutes), and finally under sterile precaution to the culture medium. Acriflavine was preferred since a thirty-minute exposure to a 1/16,000 dilution is convenient for manipulation and is less toxic for balantidia. It was found by experiment that healthy trophozoites could stand exposure in all dilutions from 1/70,000 to 1/20,000 for 60 minutes; in dilutions of 1/15,000 for 30 minutes; in dilutions of 1/10,000 for 10 minutes; and in dilutions of 1/5,000 for 5 minutes. "These experiments indicate that acriflavine is capable of sterilizing trophozoites of *Balantidium coli* against bacteria and yeasts in dilutions well within the viable limits of the ciliate."

A. A.

KUDO (R.). **Studies on Microsporidia Parasitic in Mosquitoes. VIII. On a Microsporidian, *Nosema aedis* nov. spec., Parasitic in a Larva of *Aedes aegypti* of Porto Rico.**—*Arch. f. Protistenk.* 1930. Vol. 69. No. 1. pp. 23–38. With 67 figs. on 2 plates (1 double). [2 pages of refs.]

In this paper Microsporidian parasites of the *Aedes* mosquitoes are chronologically reviewed and a new species *Nosema aedis* (sic) is described.

A. A.

BONNE (C.) & SOEWANDI. Een geval van Sarcosporidiosis bij den Mensch. [**A Case of Sarcosporidiosis in Man.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Nov. 1. Vol. 69. No. 11. pp. 1104–1106. With 4 figs. on 1 plate. [Med. High School, Batavia.]

The Sarcosporidia were found in a cavernous hemangioma from the lip of a Malay man. In a piece of muscle from the patient's calf nothing was found. As in similar cases reported, the authors consider their case to be without pathological significance.

W. J. Bais.

WIGGLESWORTH (V. B.). **Some Notes on the Physiology of Insects related to Human Disease.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 553–570. With 6 text figs. [17 refs.]

The prologue of this interesting paper insists on the importance of the study of insect physiology, since, according to the author, an impression is prevalent that the specific resistance of a particular species of insect to a particular infection is governed entirely by single chemical processes occurring in the digestive tract. [This, of course, is not the view suggested by METCHNIKOFF, the early chapters of whose classical work on Immunity deal largely with the destruction of micro-organisms by animals that have not got a digestive tract and with intracellular destruction by invertebrates (including certain insects) apart from the digestive tract.]

The author begins with digestion in the cockroach, as a good example of an insect whose diet is as promiscuous as that of man. References to his original articles on the subject (*Biochemical J.*, 1927, Vol. 21, pp. 791–811, and 1928, Vol. 22, pp. 150–161) are given. This insect has a full tale of digestive ferments, except pepsin; in the crop it has amylase, and in the midgut invertase, lactase, trypsin, erepsin, and lipase all capable of work in a medium more acid than that of the human intestine.

As two insects having an alimentary tract of generally similar structure but an entirely different diet the tsetse-fly and the bluebottle are contrasted (see this *Bulletin*, *supra*, pp. 315, 316 for more detail on this matter). In respect of physiological differences, the saliva of the bluebottle, as of the cockroach, is rich in amylase; in the tsetse-fly amylase is absent, but the saliva has been shown to contain an anticoagulin that ensures the fluidity or mobility of the ingested blood in its passage along the intestine. In the tsetse-fly, too, the proteolytic ferments of the gut are more active. The nature and function of the so-called "bacteroids" or "symbionts" in the anterior part of the gut of the tsetse-fly are again discussed and the proventriculus and its peritrophic membrane again described.

The general nature of tracheal respiration is described.

"A new theory, complementary to that of Krogh, is advanced; according to which the extent of air along the terminal tracheoles is controlled by the osmotic pressure of the tissue fluids; and since the osmotic pressure increases in active tissues, the supply of air is greatest where it is most needed. Experiments on the mosquito larva are described, by which this theory is substantiated. Some observations on the entry of oil into the tracheal system of mosquito larvae are described."

A useful list of references is given. (In the appreciatory and far-ranging discussion of the paper, Dr. C. A. HOARE drew attention to the error of a statement, current in entomology, that in *Hippobosca* and *Melophagus* the crop is absent; a crop is present in both, as well as in *Lipoptena*. And Col. F. P. MACKIE stated that "some experiments in his own laboratory on a large scale had shown that there was no substantial difference between *X. cheopis* and *X. astia* as potential plague carriers.")

A. A.

WIGGLESWORTH (V. B.). **A Theory of Tracheal Respiration in Insects.**—*Proc. Roy. Soc. Ser. B.* 1930. Apr. 2. Vol. 106. No. B 743. pp. 229–250. With 10 text figs. [15 refs.] [School of Hyg. & Trop. Med., London.]

The following is the author's summary:—

"A theory of tracheal respiration is put forward, which will provide for the increased demands for oxygen which arise locally in active tissues.

"If it be assumed that the terminal portions of the tracheal tubes are bounded by a semi-permeable membrane, then liquid will be drawn up the tubes from the tissues by capillarity until its progress is arrested by the osmotic pressure of the tissue fluids. During activity lactic acid, and, probably, other substances, will be produced, the osmotic pressure will rise, liquid will be absorbed and air will extend down the tubes towards the active tissues.

"This theory is supported chiefly by experiments on the larva of the mosquito. It has been found (i) that in the resting condition the terminal portions of the tracheoles are filled with liquid; (ii) that during asphyxiation this liquid is absorbed, and the column of air extends rapidly towards the actively contracting muscles—more slowly and much later towards inactive tissues (for example, the anal gills); (iii) that on readmission of air the liquid slowly rises to its original level; (iv) that during asphyxiation an excess of lactic acid is present in the tissue fluids; (v) that hypertonic solutions of sodium chloride and potassium lactate introduced into the living larva cause extension of air down the tracheoles; (vi) that the tissue fluids from an asphyxiated larva have a similar effect; (vii) that

hypotonic fluids (distilled water) are without effect, or cause a slight rise of the liquid in the tracheoles.

"Some observations are recorded on the effects of certain poisonous gases and the effect of oil on the tracheal system."

A useful list of references is appended.

A. A.

HECHT (Otto). Die Hautreaktionen auf Insektenstiche als allergische Erscheinungen. [**Skin Reactions to Insect Bites as Allergic Phenomena.**]—Reprinted from *Zool. Anzeiger*. 1930. Vol. 87. Nos. 3/6, 7/8 & 9/10. pp. 94-109; 145-157; 231-246. With 1 text fig. [34 refs.]

By its nature this long discussion (in which the work of other writers as well as the author's own experimental observations of bed-bug bite and the bite of *Anopheles maculipennis* are comprised) on the skin-reaction of insect-bite as a manifestation of allergy is largely, if reasonably, speculative. From all the facts reviewed the author holds that the sequelae of bed-bug bite and the primary irritant erythema following the bite of *A. maculipennis* are allergic phenomena, though the explanation of the secondary papule-like reaction to the bite of the latter insect is still uncertain.

It is well known that the bite of one and the same species of insect varies not only in the severity but also in the quality of its effects, according to the susceptibility or otherwise of the individual bitten. Clinically these susceptibilities or idiosyncrasies include shock, severe urticaria, affections of the bronchi, conjunctiva, and naso-pharynx, and gastro-intestinal disturbance. It is the explanation or classification of what is often carelessly called idiosyncrasy in the modern light of anaphylaxy, serology and allergy that is here attempted.

A. A.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 3. pp. 98-195. [**11 Papers on Medical Entomology.**]

Since the substance of several of the eleven papers here collected, which were read in 1927, has, in the interval, appeared elsewhere, there is little more now to do than to refer to those pages of this *Bulletin* in which notice of them has already been taken.

1. The paper by P. J. BARRAUD and G. COVELL on *The Morphology of the Buccal Cavity of the Mosquito*, is covered by the authors' reference to a paper by SINTON and COVELL which was noticed in this *Bulletin*, Vol. 25, p. 271.

2. A paper by V. A. STOOKES on *Some Anopheles of Sarawak*, discusses critically the 12 species *A. brevipalpis*, *A. barbirostris*, *A. umbrosus*, *A. sinensis*, *A. separatus*, *A. albotaeniatus*, *A. ludlowi*, *A. maculatus*, *A. leucosphyrus*, *A. punctulatus* var. *tessellatus*, *A. karwari*, and *A. kochi*. The author confirmed the infectivity of *A. ludlowi* in Nature.

3. In M. O. T. IYENGAR's paper on *Regional Distribution of Anophelines and Malaria in Bengal*, the Province is dissected into six zones, as follows: (a) The Montane zone (E. Himalayas) of heavy rainfall and tropical forest, with the forest species *Anopheles gigas*, *A. lindesayi*, *A. aiki*, and *A. annandalii* as characteristic. (b) The Submontane zone

(foot-hills and terai) of heavy rainfall and (prior to extensive clearing for tea) dense forest ; intensely malarious, largely owing to invasion of *A. willmorii* into clearings. (c) Pastural zone, tending to be rocky and barren, rainfall moderate, drainage good ; very little malaria except where waters have been held in for cultivation. (d) Upper Delta zone, of low-lying alluvium (rice and jute country), of shifting and silted-up river-channels ; intensely malarious in parts where natural drainage is obstructed. (e) Lower Delta zone, mostly water-logged and barely above highwater-mark ; not malarious where the river channels are freely open to tidal influences. (f) Estuarine zone (Sunderbans), a maze of saltwater creeks, mangrove swamps and dense tidal forest ; *A. ludlowi* is a characteristic species, not found elsewhere in Bengal, and breeds freely in brackish water collecting behind embankments. In a neat diagram the author shows that each of these zones has its characteristic assemblage of *Anopheles* species.

4. In *Parasitic Nematodes of Anopheles in Bengal* M. O. T. IYENGAR describes and figures a species of *Mermis* and its behaviour as a temporary parasite observed in larvae of seven species of *Anopheles*.

5. *Microsporidian Parasites of Anopheles Larvae*, by M. O. T. IYENGAR, describes three species of *Thelohania* and their life history.

6. *The Anopheles of the Australian Region, their Bionomics and their Distribution*, by F. H. TAYLOR, deals critically with 10 species (1 doubtful).

7. *Nomenclature of the Mosquitoes of Cochinchina and South Annam*, by E. BOREL, is a bare list of names.

8. In *The Habits of Anopheles in Cochinchina*, E. BOREL shows in tables the nature and conditions of the different breeding-grounds of the larvae, and the habits and pathogenous bearing of the adults.

9. The main part of J. A. SINTON'S paper on *The Identification and Classification of the Species of the Genus Phlebotomus, with some Remarks on their Geographical Distribution in Relation to Disease*, is covered by his paper reviewed in this *Bulletin*, Vol. 26, p. 255.

10. *The Breeding of Sandflies in Nature and in the Laboratory*, by R. O. A. SMITH, covers the matters of technique dealt with by two papers already noticed in this *Bulletin*—one by the author (Smith) in Vol. 22, p. 904 ; the other, by YOUNG, RICHMOND, and BRENDISH, in Vol. 23, p. 869.

11. *The Study on the Seasonal Prevalence of House-Flies in Chosen (Korea)*, by H. KOBAYASHI, has been in progress since 1916, and numerous instalments of it have been noticed in this *Bulletin*, from time to time. Here the author describes his methods of keeping flies under continuous observation—keeping them in broad test-tubes and fed on biscuit moistened daily with 5 per cent. peptone solution. In Chosen, flies generally are less frequent in the wet season (summer) than in the warm dry season. *Musca domestica* is in evidence the whole year round ; its numbers begin to increase in March, reach a maximum in May and June, decrease in midsummer, and increase again in early autumn ; after November it disappears, except in warm houses, where it is "not rare" and often propagates throughout winter. Other flies that winter as adults are the two species of *Fannia* and *Muscina stabulans*, and two species of *Calliphora*—these last also occasionally breeding then. *Stomoxys calcitrans* and a species of *Sarcophaga* winter as pupae, *Lucilia sericata* in prolonged larva and pupa stages.

NIESCHULZ (Otto). Ueber die mechanische Uebertragung von einigen Bakterienkrankheiten durch blutsaugende Insekten. [**On Mechanical Transmission of Some Bacterial Diseases by Bloodsucking Insects.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 282–287 (366–371). [13 refs.]

This paper appears to be a review of somewhat belated experiments made in the Netherlands East Indies to test the capacity of various common bloodsucking flies to spread certain infections mechanically. The infections in question were surra, anthrax, buffalo-plague, and symptomatic anthrax, and the flies tested were species of *Tabanus*, *Chrysops*, *Stomoxys*, *Lyperosia*, *Musca inferior* (a true bloodsucker), *Anopheles*, *Armigeres*, and *Stegomyia*. The details (chiefly interesting to veterinarians) must be sought in the paper itself and its references; it is sufficient here to note the general conclusions that it is not easy to make a generally conclusive statement, since the capacity for mechanical transmission of the same disease differs with different flies; that undoubtedly bloodsucking flies can remain infective for several days—particularly *Tabanidae*, which in experiments with surra, anthrax, and buffalo-plague, were the best transmitters; and that the part played by such flies is not negligible.

A. A.

TRAVASSOS (Lauro). Ueber einige Arthropoden als Plagegeister der brasilianischen Küstenzonen. [**Some Arthropod Pests of the Brazil Coast.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 273–279 (357–363).

Discursive remarks on some simple pests (not transmitting disease) of the Brazil coast—the horse-tick (a species of *Amblyomma*), the *borrachudos* (unnamed *Simuliidae*), the jigger flea, the *Dermatobia hominis* larva (*berne*), the *motucas* (*Tabanidae*) and the *maruins* (*Ceratopogons*).

A. A.

HOFFMANN (Carlos C.). Monografías para la entomología medica de Mexico. [**Monographs on the Medical Entomology of Mexico.**]—*An. Inst. Biol. Univ. Nac. Mexico.* 1930. Vol. 1. No. 2. pp. 135–164. With 28 text figs.

In this, the first instalment, *Argas persicus*, *Ornithodoros megnini*, Dugés, *O. turicata*, Dugés, *O. talaje*, Guérin, and *O. coriaceus*, Koch, are fully described, along with a "key."

H. H. S.

MAYNE (Bruce). **A Study of the Influence of Relative Humidity on the Life and Infectibility of the Mosquito.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1119–1137. With 3 figs. on 1 plate. [17 refs.]

This paper although long is a model of conciseness and must be consulted in original. In the introduction, recent writings on the inter-relations of humidity and temperature as affecting the life and the sensitivity to infection of the mosquito are reviewed, and the detail of the author's laboratory menage is described. The range of

experiment includes the following series: Reaction of *Culex fatigans* to various temperatures below and above 80° F. Effect of humidities at various temperatures below 67° F. and above 80° F. on several species of Anopheles. Effect of humidity in *Anopheles subpictus* and *A. stephensi* infected with *Plasmodium vivax*. Species adaptation to relative humidity. Comparison of effect of drought and effect of high humidities on infection of *C. fatigans*. Influence of relative humidity on the biting stimulus of *C. fatigans*. Influence of heat on the life of the mosquito and its parasites. The details of the series of experiments are tabulated and discussed, and the author's final summary of results is as follows: —

"In experiments with *Culex fatigans* and organisms of bird malaria the minimum effective range of humidities permitting of both life of the mosquito and viability of the imbibed malaria organism was observed to be 44 to 46 percentage in both series of mosquitoes maintained at temperatures up to 72° F. and at temperatures above 80° F.

"At relative humidities under 42 percentage and dry bulb temperatures of 73° F. or under, out of a total of 195 mosquitoes applied only 4 specimens were induced to bite and these became infected. At temperatures above 80° F. at similar relative humidities none of 128 applied survived more than 4 days nor became infected. At equal temperature and 43 percentage humidity two specimens of mosquitoes survived 3 days, showing incipient parasite development.

"In similar tests with anophelines at temperatures under 67° F. and relative humidities from 38 to 55 percentage *A. culicifacies* and *A. subpictus* failed to survive one week, while more than 200 specimens of *A. fuliginosus* survived fully 17 days at a minimum relative humidity of 38 percentage. At temperatures above 80° F. these three species failed to resist a desiccating atmosphere of 40 to 42 percentage for more than 24 hours.

"At relative humidities ranging from 55 percentage and above at temperatures above 80° F. and at relative humidities above 57 percentage and at temperatures below 67° F. all three species survived from 1 to 4 weeks.

"The experiments on the effect of relative humidity on the development of the malaria parasites in *Anopheles subpictus* and *A. stephensi* resulted in survival and infection of 2 specimens of *A. subpictus* in 1 to 3 days at 39 to 42 percentage relative humidity and 4 specimens during a period of 6 to 13 days at relative humidity of 54 to 59 percentage. In the latter test, development in the mosquitoes was carried to the sporozoite stage.

"In the instance of six specimens of *A. stephensi* which succeeded in biting the patient, three of them during a course of 5 to 11 days at relative humidities of 80 to 88 per cent. demonstrated various stages of Plasmodian infection. Only one showed a few gland sporozoites.

"In these meteorological tests there was a definite result obtained indicating a species adaptation to relative humidity. This consisted of an effective range of relative humidity allowing for an infective period in the mosquito at an optimum temperature for functioning. The following range of percentage of minimum relative humidity was established. *A. fuliginosus* 38 to 40, *Culex fatigans* 43 to 45, *A. subpictus* and *A. stephensi* 55 to 58, and *A. culicifacies* 57 to 62.

"It was determined, for an aestivating period involving a relative humidity of 44 to 50 percentage, that infected mosquitoes (*C. fatigans*) survived for periods up to more than 3 weeks (24 days). These had been maintained at normal high humidities for 10 days previously. Seventy-eight per cent. of these retained their malaria parasites during the period of enforced drought, contrasted with 72 per cent. of control specimen, which remained infected through 34 days of the experiment.

"The relation of relative humidity to the stimulus of seeking blood in the mosquito was tested. The results of these biting tests indicate that

biting does not occur at relative humidities under 52 percentage even in the presence of high dry bulb temperatures. This demonstrates that this species of mosquito (*C. fatigans*) cannot be induced to bite in an atmosphere of relative humidity in which it is unable to survive desiccation."

A. A.

BEATTIE (M. V. F.). **Physico-chemical Factors in Relation to Mosquito Prevalence in Ponds.**—*Jl. Ecology*. 1930. Feb. Vol. 18. No. 1. pp. 67–80. With 5 figs. & 1 plate. [8 refs.] [Summarized in *Rev. Applied Entom.* 1930. June. Ser. B. Vol. 18. No. 6. pp. 109–110.]

HOWLAND (L. J.). **Bionomical Investigation of English Mosquito Larvae, with Special Reference to their Algal Food.**—*Ibid.* pp. 81–125. With 10 figs. [26 refs.] [Summarized in *Rev. Applied Entom.* 1930. June. Ser. B. Vol. 18. No. 6. pp. 109–110.]

Both summaries relate to investigations of the same ponds, in Buckinghamshire. Chemical factors considered to bear upon the breeding of the mosquitoes (*Anopheles maculipennis*, *A. bifurcatus*, and various Culicines) were pH, H_2S , organic N, and dissolved O. There was no correlation between larval incidence and ammonia N. No biological significance is attributed to the small amounts of solids and chlorides. More attention should have been given to nitrates, nitrites, and phosphates. The second author examined 1,000 larvae of various species and noted the frequencies of the algae in the gut. No definite correlation was observed between the number of larvae and the pH and the CO_2 tension of the water, nor between the size of the larvae and that of the algae eaten. The larvae in any one pond did not seem to have any predilection for any one kind of food; but the species occurring in a pond seemed to be related to the algal flora. Apparent correlations between the spring and summer phases of algae and the appearance of larvae were noted. The Culicines consumed more algae than the Anophelines.

A. A.

MATHESON (Robert) & HINMAN (E. H.). **A Seasonal Study of the Plankton of a Spring Fed Chara Pool versus that of a Temporary to Semi-Permanent Woodland Pool in Relation to Mosquito Breeding.**—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 174–188. With 1 chart in text. [13 refs.]

The authors in N. America have studied the plankton of a drying mosquito breeding-pool during its summer existence of four months, and of a Chara pool for 12 months. Their observations show that both phyto- and zoo-plankton "are more varied and abundant in a non-breeding pool (Chara) than in a typical breeding-pool," and they therefore think that plankton cannot be the chief food of mosquito larvae. They suggest that the paradoxical inhibitory effect of Chara noticed by them may be due to excessive oxygenation of the larvae. They agree that "bacteria *per se* are not essential for mosquito breeding"; and they think that varying pH in natural waters has little meaning.

A. A.

HAYES (T. H.). **Report of Mosquito Survey in St. Croix.**—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 194–222. With 1 map in text.

This is a record of a very well executed mosquito survey of St. Croix, a small unit, about 84 square miles in extent, of the Virgin Islands that lie east of Porto Rico. In 1926 immigrants from Porto Rico (where malaria is prevalent) began to settle in St. Croix. Before that event, malaria had for many years been extremely rare among the natives of St. Croix; afterwards (early in 1927) it began to be well noticed. It is now discovered that breeding-grounds of *Anopheles*—to wit, watercourses, streams, and natural ponds and freshwater lagoons—are more numerous than was supposed in an island having a reputation for dryness of soil; also that *Anopheles*, once said to be non-existent locally, is well represented by the dangerous *A. albimanus*, and that *A. grabhamii* has once been seen. Adults anophelines, however, have rarely been found inside houses, though common in stables, pigsties, corrals, and outhouses. In cisterns, rain-barrels, and domestic utensils of many kinds free breeding is provided for domiciled mosquitoes, among which *Culex 5-fasciatus* (= *fatigans*) and *Aedes aegypti* are included. All these matters are noticed in much detail, as well as the natural enemies that exist in the waters of the island.

A. A.

SHANNON (Raymond C.). Creadouros de mosquitos em depositos artificiaes encontrados nos terrenos baldios. Zonas da Victoria e Nazareth, Bahia. [**Breeding of Mosquitoes in Uncultivated Land in the Nazareth and Victoria Districts of Bahia.**]—*Folha Med.* 1930. July 5. Vol. 11. No. 19. pp. 222–225.

This investigation was undertaken to ascertain the extent of breeding of *Aedes* in old tins, jars, coconut shell, etc., in waste land near dwellings. Of 284 such receptacles 236 contained larvae of some kind, 176 *Aedes aegypti* and many of them *Limatus durhami* also. The average numbers per receptacle containing water were:—

In Nazareth, 23.5 *Aedes aegypti*; 5.2 *Culex quinquefasciatus*; 4.8 *Limatus durhami*. In Victoria, 5.0 *Aedes aegypti*; 4.0 *Culex quinquefasciatus*; 13.0 *Limatus durhami*.

In Victoria houses occupied only one side of the waste land; in Nazareth such land more or less surrounded the houses. Generally speaking *Aedes* larvae were found in discarded tins (e.g., in 66 per cent. of those in Nazareth), and rarely further distant from dwellings than 200 metres; they were much fewer in broken pottery.

A. A.

LEGENDRE (J.). La protection animale contre les moustiques au Sénégal et en Haute-Volta. [**Zooprophylaxis against Mosquitoes in Senegal and Haute-Volta.**]—*Bull. Acad. Méd.* 1930. Feb. 25. Year 94. 3rd Ser. Vol. 103. No. 8. pp. 221–224.

Legendre again descants on "zooprophylaxis," or the diversion of noxious and dangerous mosquitoes from man to his domestic and

domesticated animals, like the horse, bovines, pig, dog, rabbit, deer, monkey, crow, etc., with the object of awakening observers in the colonies to the importance of a serious study of the subject.

A. A.

NIESCHULZ (Otto). Bemerkung über Mücken-zucht. [A Note on rearing Mosquitoes.]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 3. Vol. 115. No. 5/6. pp. 399–400. With 1 text fig. [Inst. for Infectious Diseases & Parasitology, Utrecht.]

This note describes and figures a feeding arrangement whereby the animal (e.g., a small guineapig) that supplies an infective feed lies outside the cage in which the insects taking the feed (e.g., *Stegomyia fasciata*) live, thus obviating the risk of escape of infected insects. The sleeved cage where the insects live is of gauze on a wooden frame. In its wooden roof is a largish hole, which is stopped-up by a shallow pocket (of fine-meshed gauze) that hangs into the cage. In this gauze pocket, or trough, the animal supplying the feed is closely confined, so as to expose its belly to the bites of the insects through the gauze. Within the cage, at some little distance below the pocket, a tin tray with absorbent wool has been slung horizontally, to catch the animal's urine and keep the insects' residence clean.

A. A.

STRICKLAND (C.) & CHOWDHURY (K. L.). On trapping Adult Mosquitoes.—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1009–1014. With 2 text figs. [1 ref.]

In the course of malaria surveys in Upper Assam during the hot and the rainy seasons of two years (1927 and 1928) traps of two kinds were compared for catching adult mosquitoes in cowsheds and other buildings. One kind is an ordinary tea-plucker's basket fitted with a lid having an entrance-hole and served inside and outside with cowdung: the other kind is an ordinary tea-box with entrance-hole (and movable cover) and blackened inside. In the comparisons in all localities a trap of each kind was set, side by side. The figures of the catches are tabulated. The general conclusions are that the box-trap was about 12 per cent. better than the basket-trap for catching both culicines and anophelines, that females were caught very much more frequently than males in the box-traps; and that "apparently the boxes were much better than the baskets as far as nearly all the anopheline species, including the well-known malaria-carriers, were concerned."

A. A.

MIYAMOTO (Saichi). Ueber die Vernichtung von Moskitos durch *Pipistrellus abramus* in der Nähe der Stadt Taihoku. [On the Destruction of Mosquitoes by *Pipistrellus armatus* in Taihoku.]—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1930. Apr. No. 301. [In Japanese. German summary p. 19.] [Med. School, Taihoku.]

In the stomach of 12 of 45 bats (*P. abramus*) examined between August and December the author found mosquitoes. As an instance of the appetite of this kind of bat one individual was able to catch 1,537 mosquitoes in 3 hours, and three others had the stomach more than half full of those insects.

A. A.

KAISER (L.). Het intermitteerend moeras van Rangas. [**The Intermittent Swamps of Rangas (Celebes).**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. July 1. Vol. 70. No. 7. pp. 692-694. With 2 figs. on 1 plate.]

The point here is that the mosquito-larvae of a tidal swamp near a malarious sea-coast village in Celebes did not die when the water ran out with the ebbing tide. The swamp therefore had to be filled in above the level of high-water mark.

W. J. Bais.

ANCONA (H. L.). Las lemnaceas y las larvas de los mosquitos. [**Lemnaceae and Mosquito Larvae.**—*An. Inst. Biol. Univ. Nac. Mexico*. 1930. Vol. 1. No. 1. pp. 33-37. With 5 text figs. [2 refs.]]

Lemna even in a continuous layer did not retard development of *Culex tarsalis* or *Anopheles quadrimaculatus*; azolla did so under natural conditions only when in a thick layer, but experimentally a very thin layer of the two together was effectually preventive.

H. H. S.

MASLOW (A. W.). Das kritische Temperaturminimum der ueberwinternden Mücken. [**The Critical Minimum Temperature for Hibernating Mosquitoes.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Mar. Vol. 34. No. 3. pp. 170-173. [2 refs.] [Malaria Station, Tomsk.]

The critical temperature for the wintering *Anopheles maculipennis* is here determined to be $-40^{\circ}\text{C}.$, and for the wintering *Culex pipiens* -17 to $-18^{\circ}\text{C}.$ At an average mean temperature of $-18^{\circ}\text{C}.$ and an average minimum temperature of $-23^{\circ}\text{C}.$ *A. maculipennis* can live for weeks or months.

A. A.

DOVER (Cedric). **An Improved Citronella Mosquito Deterrent.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. p. 961.

It is well known that oil of citronella, used as a mosquito deterrent, often irritates the skin and quickly loses effect from its volatility. The following formula has been found effective.

" Citronella oil (Burgoyne's) ...	...	...	$\frac{1}{2}$ oz.
Spirits of camphor ...	...	...	$\frac{1}{2}$ oz.
Cedar-wood oil ...	...	...	$\frac{1}{2}$ oz.
White petroleum jelly (B.P.) ...	...	...	2 ozs.

" The petroleum jelly should be melted and the other constituents then added, the mixture being well-stirred. Bottle (a 3 oz. wide-mouthed jar is a convenient size) and cool rapidly, preferably by placing the bottle (which should be kept closed) in a basin of cold water or in a refrigerator.

" The formula gives a firm, whitish, non-staining cream of pleasant odour which, in addition to its properties as a mosquito-deterrent, is soothing, antiseptic and beneficial to the skin (petroleum jelly, it will be remembered, is the base of most face creams). One application usually lasts for a whole night, and only a very small quantity need be used on each occasion. To avoid using it on the face in the evenings, the cream has been employed by some as a brilliantine for the hair, as it was found that for a time this keeps mosquitoes away almost as successfully as if the whole face were smeared with it."

J. F. C. H.

DE BOISSEZON (P.). Les réserves dans le corps gras de *Culex pipiens* L. et leur rôle dans la maturation des oeufs. [The Reserves in the Fat-Body of *Culex pipiens* L. and their rôle in the Maturation of the Eggs.]—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1232–1233. [1 ref.]

——. Le rôle du corps gras comme rein d'accumulation chez *Culex pipiens* L. et chez *Theobaldia annulata* M. [The rôle of the Fat-Body as a Stock of Capital in *Culex pipiens* L. and in *Theobaldia annulata* M.]—*Ibid.* pp. 1233–1235. [1 ref.]

In an earlier paper (*supra*, p. 296) the author reported that it is possible for the female of *Culex pipiens* though kept rigorously starved to produce egg-rafts, provided she had been well fed on a diet rich in proteid during her larval phase. In the present studies he traces the secretion of fatty globules and albuminoid granules in cells of a special kind (trophocyte) in the fat-body in the peripheral cells of which body they accumulate as a store of nutriment. He follows the process from its beginnings in the early larva stage to its issue in the imago stage, and in the starved female he notes the disappearance from the cells of the fat-body of all the albuminoid granules and most of the fat globules after the maturation and discharge of the eggs.

A. A.

SHANNON (R. C.), BURKE (A. W.) & DAVIS (N. C.). Observations on Released *Stegomyia aegypti* (L.) with Special Reference to Dispersion.—*Amer. Jl. Trop. Med.* 1930. Mar. Vol. 10. No. 2. pp. 145–150.

—— & DAVIS (N. C.). The Flight of *Stegomyia aegypti*.—*Ibid.* pp. 151–156. With 1 map in text. [4 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

i. In the course of four experiments, 3,500 of *Stegomyia aegypti* were stained and set free in a house affording food, water, and good shelter, and also harbouring some lizards (gecko) and spiders. At the end of a week, more than 90 per cent. had disappeared from that house, and two weeks afterwards less than 1 per cent. could be found there. One specimen was retrieved, 17 days after release, in a house 120 metres distant. In one of the experiments, when the search for the stained insects began on the next day, 54 per cent. were recovered that day and another 15 per cent. in the course of the five days following, and of the whole of these (69 per cent.) 66 per cent. were taken in the house of release, and 3 per cent. in a house adjoining. It is noted that gentian-violet is a bad stain for the insects. Weak water-solutions of methylene-blue and of eosin were used.

ii. In the course of 3 experiments, 20,000 stained individuals of *Stegomyia aegypti* were set free in small villages in the outskirts of Bahia (Brazil). Two individuals were recovered in houses more than 300 metres distant from the point of release, and 95 at points intermediate.

Another lot of 12,000 stained individuals were liberated from a boat 900 metres distant from one bank of a river and 300 metres from the other. Less than 0.4 per cent. of them were recovered. Eight individuals were retaken on the more distant bank. After a week stained individuals became exceedingly scarce. The last recapture was made 13 days after release.

The above experiments, as the authors state, suggest either that dispersion is very quick and wide, or that mortality is very high.

A. A.

SYMES (C. B.). **Anophelines in Kenya.**—*Kenya & East African Med. Jl.* 1930. Apr. Vol. 7. No. 1. pp. 2-11. With 5 figs. (1 map). [1 ref.]

It is stated in this excellent report that 19 species of *Anopheles* have been encountered in Kenya. In over 15,000 searches within dwellings and cattle-bomas and stables, during 18 months, 10 species have been caught, but 6 of them so rarely that "their presence in buildings seems to be purely accidental,"; the prevalent domiciliary species are four, namely, *costalis* and *funestus*, and after them *christyi* and *cinereus*. (It is noted incidentally, that the smoke-laden atmosphere of native huts is no hindrance to the entry of anophelines.) *A. cinereus*, though not entirely exclusive in taste, definitely prefers blood of cattle; so also perhaps does *christyi*.

A. costalis and *funestus* "in all areas dealt with are pre-eminently the domestic species." In 1,011 precipitin tests with *costalis* 82.3 per cent. were positive to human blood. *A. costalis* breeds mostly in open stagnant water, and occurs in greatest numbers soon after the onset and throughout the course of the wet-season; *A. funestus* prefers clear and shaded water, and is most abundant when rivers return to normal flow after the wet season, though in places where larvae are naturally protected from the flushing effect of rain-storms it may be numerous also during the wet season. Both species are naturally infected and infective in Kenya. (Other Kenya species examined—in very small numbers—for infectivity have given a negative result, so far). Present evidence justifies the conclusion that *A. costalis* is responsible for the wet-season rise (and for at least one epidemic) of malaria when the predominant infection is subtertian. The evil part played by *A. funestus* is less exactly known; this species is much more numerous than other species in areas of high malarial endemia, some of which are foci of blackwater and sometimes also of *P. malariae*. The flight of these anophelines has not been studied experimentally, but there is fairly trustworthy evidence of a flight of more than 3 miles from the nearest known breeding-grounds by *A. costalis*.

Some "small investigations," as the author describes them, have been made of the pivotal circumstances influencing larval development. No evidence has been elicited that any given species is influenced by changes of pH inside limits that normally occur in its natural waters. On the other hand, results so far obtained with oxygen absorption of anopheline breeding-waters (as a rough measure of organic matter) appear to promise something.

A. A.

CHODOUKINE (N. J.). Mécanisme hétérodynamique chez quelques espèces d'*Anopheles*. [**Heterodynamy in Anopheles.**]—*Pensée Méd. d'Usbéquistan et de Turquéménistan*. Tashkent. 1930. Apr.-May. No. 7/8. pp. 58-66. [In Russian script. French summary pp. 123-124.]

The author observes that females of *Anopheles hyrcanus*, issuing from autumn larvae, when they are fed on blood, do not form a fat-body and die in 5 or 6 days; but when they are fed on syrup they proceed to form a fat-body and to hibernate. Hibernating females of the local variety of *A. maculipennis* will suck blood in the laboratory, and will then lay eggs, but their fat-body shrinks. He observes also that

autumn-issuing females of *A. bifurcatus* and *A. pulcherrimus* have not a fat-body when they issue from the pupa-case, but that the hibernating larvae of these two species have the fat-body very well developed; whereas the contemporary females of *A. superpictus*, *hyrcanus*, and the local *maculipennis* have a fat-body when they issue, though in the hibernating larvae of these three species the fat-body is ill developed. In a year-long study of the female salivary glands of Anopheles the author finds that their anticoagulant activity begins to fail in winter, concurrently with the development of the fat-body.

A. A.

IYENGAR (M. O. T.). **Dissolved Oxygen in Relation to Anopheles Breeding.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1171–1188. With 17 charts & 1 text fig. [1 ref.]

In 332 ponds and ditches at Sonapur in Lower Bengal, in which six species of Anopheles were breeding, the author studied the range of variation in the amount of dissolved oxygen. Estimation of dissolved O was carried out by Winkler's method, care being taken to make sure that dissolved nitrites were not present. The dissolved oxygen ranged from zero to 6.5 mgm., but in the majority of breeding-places from 1 to 4 mgm., per litre of water. A diurnal fluctuation in dissolved oxygen concentration was constantly observed in the surface-water of ponds, the level being lowest at 6 a.m. and highest between 2.30 and 3.30 p.m. All the species of Anopheles present (*barbirostris*, *hyrcanus*, *fuliginosus*, *varuna*, *subpictus*, *pseudojamesii*) were found breeding in all degrees of dissolved oxygen concentration; nor were the larvae affected in any way by the diurnal fluctuation. The numbers of *pseudojamesii* and *hyrcanus* larvae, it is true, showed a diminution with increasing oxygen concentration; but it is possible that this apparent relation is merely coincidence "due to the association of these two species with the aquatic plant Pistia." The author, at any rate, maintains that "there is no evidence of any 'oxygen toleration limits' in any of the species studied."

A. A.

PASHITNOWA (Z. A.). Materialien zur Erforschung der Mikrofauna der Reisfelder und die Biologie der Anopheleslarve auf den Reisfeldern. [Material for the Study of the Microfauna and the Biology of Anopheles Larvae in Ricefields.]—*Acta Univ. Asiae Mediae*. Tashkent. Ser. 8a. Zool. 1929. No. 10. pp. 1–36. [25 refs.] [In Russian script. German summary pp. 37–40. With 4 figs.]

This is a general survey of ricefields around Tashkent in Turkestan, and their microphyta and microfauna (Protozoa, rotifers, Entomostraea, insect larvae, etc.). Three species of Anopheles larvae were observed—*A. pseudopictus*, *A. maculipennis*, and *A. pulcherrimus*—particularly in the early part of September. Examination of the gut of 55 larvae of sundry ages showed them to be for the most part omnivorous (chiefly diatoms and other microphytes). Under conditions as near as possible to nature, at temperatures ranging from 20° C. to 28° C., their aquatic development was completed in 22 to 13½ days.

A. A.

SEPULCRI (Piero) with the collaboration of SCRINZI (Enrico). Contributo allo studio del problema dell' anofelismo nel Veneto. (Valli da pesca e caccia, bonifiche e anofelismo.) (**Contribution to the Study of Anophelism in Venetia. Fenland and Fenced Fisheries, Agrarian Sanitation Works and Anophelism.**)—*Riv. di Malariaologia*. 1929. Nov.-Dec. Vol. 8. No. 6. pp. 637-668. With 14 text figs. (3 maps). [English summary p. 747.]

The point of general interest in this local Venetian problem is that the drainage of one tract where anopheles larvae flourish, although it may benefit that tract from the agricultural standpoint, may increase the "anophelism" of another neighbouring tract where the drainage channels debouch. Thus, in the "valli" (fenced freshwater fisheries) of a lagoon and its surrounding fenland, anophelism, which naturally is rare in the valli, is favoured there by the inflow of water from the assanitation works of the fenland. [The argument is better expressed in the French summary (p. 745) than in the English.]

A. A.

MIELDAZIS (J. J.). **Preferential Breeding Conditions of Anopheles in the Philippine Islands.**—*Philippine Jl. Sci.* 1930. Jan. Vol. 41. No. 1. pp. 59-63. With 6 plates.

In the Philippine Islands *Anopheles minimus* favours streams heavily shaded by bamboo; *A. maculatus*, streams exposed to the sun; *A. philippinensis*, Pistia waters; *A. ludlowi* and *A. subpictus*, brackish and salt water; the particularly common *A. vagus*, contaminated waters; *A. barbirostris*, water-weed at edges of streams or floating in rivers, and ricefields; *A. fuliginosus*, streams and rivers and ponds of rainwater; *A. kochi*, pools of rainwater and rice-fields.

A. A.

BRIGHENTI (Dino). La distribuzione geografica degli anofelini in Italia. (**Geographical Distribution of Anophelines in Italy.**)—*Riv. di Malariaologia*. 1929. Nov.-Dec. Vol. 8. No. 6. pp. 694-701. [27 refs.] [English summary p. 748.] [Zoolog. Inst., Univ., Bologna.]

Anopheles maculipennis, *A. bifurcatus*, and *A. algeriensis* are distributed throughout the Italian peninsula. *A. plumbeus* only in the northern area, *A. superpictus* and *A. italicus* in the south, *A. sacharovi* and *A. pseudopictus* in coast-land and rice-lands.

A. A.

IYENGAR (M. O. T.). **Larvae of Oriental Tree-Hole Breeding Anophelines.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 769-776. With 2 plates. [12 refs.]

The chronological history, geographical distribution, generally distinctive characters, and individual differential characters of the larvae of the Oriental tree-hole anophelines are here discussed. They are all, so far as is known, restricted to hill forests. The species are *Anopheles culiciformis*, from the hills of the Malabar coast; *A. barianensis*, from the Punjab and Kashmir above 6,000 ft.; *A. annandalii* from the E. Himalayas, Khasi Hills, and Ceylon; *A. annandalii* var. *dajasensis* from Java above 4,000 ft.; and *A. asiaticus* from the Malay Peninsula. (A mention is made of *A. sintoni*—described as a new species by PURI in *Ind. Journ. Med. Res.*, 1929, Oct.—which is found in the same tree-holes with *A. culiciformis*.)

A. A.

WALCH (E. W.) & SOESILO (R.). **A Comparative Study of the Pecten of the Netherlands Indies Anopheles-Larvae, preceded by Some Other Morphological Observations.**—*Meded. Dienst. d. Volksgezondheid in Nederl.-Indië*. 1929. Vol. 18. No. 3. pp. 453-468. With 24 figs. on 2 plates (1 folding). [13 refs.] [Med. Lab., Weltevreden.]

This is a minutely comparative entomological study, freely illustrated. Attention is drawn to the fact that the pectens of *Anopheles* larvae besides their well-defined and sometimes diagnostic specific differences, may also show conspicuous subter-specific variations from the specific standard. It is noted (in their local provenance) of their closely similar larvae that the pectens of the saltwater forms of *ludlowi* and *rossi* are different, though the pectens of the freshwater forms cannot be distinguished from one another; the clypeus hairs, however, of almost all freshwater *rossi* larvae are branched and of almost saltwater *rossi* are not branched.

A. A.

BRAGINA. *Anopheles*larven fressende Hydra. [**A Hydra devouring an Anopheles Larva.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 57-58 (141-142). With 1 text fig.

Enlarged drawing of a Hydra with a partly digested *Anopheles* larva in its stomach, ejecting the larval skin, and at the same time holding and proceeding to swallow another *Anopheles* larva. The Hydra was swimming free in an aquarium.

A. A.

DE BUEN (E.). Etude expérimentale sur quelques méthodes employées dans la lutte contre les larves d'Anophèles. [**Experimental Study of Some Methods of suppressing Anopheles Larvae.**]—*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 402-427. With 1 text fig.

The conclusion of these studies is that the best and cheapest method of clearing out *Anopheles* larvae is a confederation of the Cyprinodont fish *Gambusia* and Schweinfurt green (aceto-arsenite of copper). To start with, the fish are let loose, and then, in prudent time (and if it be found necessary), applications of the arsenite are made every ten days so long as they appear to be needed. Thereafter, if the original *Gambusias* have disappeared, another batch must be brought in as a garrison.

A. A.

QUAIFE (W. T.). **A Trial of Paris Green as a Larvicide in Moving Water in Selangor, F.M.S. With a Summary of Previous Work on Paris Green.**—*Malayan Med. Jl.* 1930. Mar. Vol. 5. No. 1. pp. 26-29. [24 refs.]

The sample used contained 54.5 per cent. arsenic as arsenious acid. The trial ground was 300 metres of open earth drains with slowly moving clear water. The anophelines were chiefly *A. maculatus* and *A. vagus*. The sample was diluted with finely sifted wood ashes and scattered by hand: but "hand-scattering is not a sound method for practical work." The application was made weekly from September to January. All larvae were not killed unless 2 cc. in 5 cc. of dust were used per square metre, an uneconomic proportion. In the quantity recommended there was little diminution of large larvae. It is concluded that Paris green appears to be of little or no value as a larvicide for inland Malaya, where

the majority of breeding places of dangerous anophelines consists of water moving more or less rapidly.

The author gives a summary of the papers published on this subject, from which he concludes that for moving water it has yet to be shown that Paris green can supplant oiling.

A. G. B.

DE BUCK (A.), SCHOUTE (E.) & SWELLENGREBEL (N. H.). **Racial Differentiation of "*Anopheles maculipennis*" in Netherlands and its Relation to Malaria.**—*Riv. di Malarologia*. 1930. Mar.-Apr. Vol. 9. No. 2. pp. 97-110. With 2 figs. [15 refs.] [Royal Colonial Inst., Amsterdam.]

In 1926 and 1927 (see this *Bulletin*, Vol. 23, p. 712, and Vol. 24, p. 883) VAN THIEL drew attention to the existence in certain parts of Holland of two distinct varieties of *Anopheles maculipennis*. One, which predominates in non-malarious districts, is larger, lighter, longer in wing, and (female) has fewer maxillary denticles; the other, which breeds in the brackish waters of malarious tracts, is smaller, darker, shorter in wing, and (female) is more denticulate. He suggested that the slight structural modifications of the latter variety, as well as its particularly facile concurrence with endemic malaria, might have been brought about through the changed conditions of its larval life in brackish water. Subsequently the authors of the present paper (see this *Bulletin*, Vol. 24, pp. 879-880, and Vol. 26, p. 915) also noticed the occurrence in Holland of these two varieties, one breeding in fresh water and the other in brackish water, and seemed to be not ill-disposed towards VAN THIEL'S suggestion. They further observed that although both varieties are hospitable to malaria, the shorter-winged pluridenticate variety is more continuously voracious than the other variety, and also remains considerably active during winter, and thus (so they argued) is better qualified to acquire the infection and to maintain it through winter than is the longer-winged variety which remains quite dormant throughout that season.

In the present paper the collaborators dissent from the view that the differences of the shorter-winged variety are directly traceable to peculiar conditions of its larval life in a saline medium. They indicate the existence of other [frail] differences besides those mentioned—to wit a difference in the number of "ribs" in the floats of the egg, a difference in the number of branches in a particular hair of the larva, and a difference in the form of a particular spine of the claspette of the male. They state that all the differences between the two varieties breed true for each variety in insects bred "under exactly the same conditions" from eggs obtained in nature (and also for the insects of the short-winged variety raised from individuals that had themselves been bred in the laboratory), and they are therefore convinced that the two varieties are "two races" and "differ genetically and not only through the influence of dissimilar external conditions." [We here meet the at present insoluble problem of the exact method of evolutionary progress—whether it is brought about by modifications of the environment, or entirely by changes in the inherent constitution of the organism, or by the interplay between the environment and the hereditary constitution of the organism—a controversy that lies outside the range of this *Bulletin*.] Beside the small structural differences, the authors confirm and amplify those "biological"

differences between the two varieties or races that make the one an efficient and the other an inefficient agent in the maintenance of malarial infection, namely—(1) the earlier advances of hibernation and the complete abeyance of feeding and sexual ability of the long-winged race throughout winter; and (2) the later advances of hibernation and the persistence of blood-appetite and sexual capacity in the short-winged race during that season. It is noted that owing to the inability of the long-winged males to pair in close confinement the authors could not prove that this race breeds true from parents "raised" in captivity; also that owing to the repugnance of the wintering long-winged females to blood they are bad laboratory subjects for experimental malaria infection. All their observations confirm the authors' view that the long-winged race is but a summer visitor in houses, whereas "the short-winged race is essentially an indoor mosquito."

A. A.

TRENSZ (F.). Recherches sur l'index maxillaire de *Anopheles maculipennis*, (note préliminaire). [**Investigations of the Maxillary Index of *Anopheles maculipennis*. Preliminary Note.**].—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 43-47. [2 refs.] [Pasteur Inst. of Algeria, Algiers.]

ROUBAUD (E.). Quelques remarques à propos de l'interprétation théorique des index maxillaires. [**Some Remarks on the Interpretation of the Maxillary Index.**].—*Ibid.* pp. 47-53.

From a study of 4,244 maxillary indices of *Anopheles maculipennis* in Algeria, Italy, and continental France, Trens, in this preliminary paper, cannot discover a single fact in favour of E. ROUBAUD's theory of zootropism. ROUBAUD in his reply to this criticism remarks on the necessity of taking thought against hasty and preemptory arguments.

A. A.

BOYD (Mark F.). **The Cage Rearing of *Anopheles quadrimaculatus*.**—*Amer. J. Trop. Med.* 1930. May. Vol 10. No. 3. pp. 165-175. With 5 text figs. [Station for Field Studies in Malaria, Edenton, North Carolina.]

Descriptions in minute detail of an insect-house 8 feet square and 12 feet high, designed for the "development of a technique that will permit the successful cage-rearing of anophelines for indefinite generations." The descriptions cannot be abridged. It appears, however, that after several years of trial and partial success the author has managed to breed only to a third generation—less in number and less bloodthirsty than the second generation, and failing to produce eggs.

A. A.

SAWADSKY (M.). *Anopheles pulcherrimus* (Theob.) als Malariaüberträger (vorläufige Mitteilung). [***Anopheles pulcherrimus* Theob. as a Malaria-Carrier (Preliminary Communication).**].—*Pensée Méd. d'Usbequistane et de Turquemenistane*. Tashkent. 1929. Nov.-Dec. No. 2/3. pp. 22-24. [4 refs.] [In Russian script. German summary pp. 146-147.]

It is stated in the German summary that *Anopheles pulcherrimus* is widely distributed in Central Asia, although malaria-infected individuals had never been discovered in nature. The announcement is made that a female with sporozoites in the salivary glands has come to light in the Golodnaja Steppe.

A. A.

HECHT (Otto). Ueber die Eiablage von *Anopheles bifurcatus*. [**The Ovipositing of *Anopheles bifurcatus*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 640-644. [12 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Observations, with some long digressions, on the ovipositing of *Anopheles bifurcatus* in captivity. As a novel observation the author states that the eggs for the most part were laid on the inhospitable ground of the cage, although three water-vessels were provided.

A. A.

SMORODINZEW (I. A.) & ADOWA (A. N.). Le rôle du calcium dans l'écologie des larves d'anophèles. [**The Rôle of Calcium in the Ecology of *Anopheles Larvae*.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 34-38. With 1 text fig. [3 refs.]

— & —. Sur le rôle de la réaction du milieu dans l'écologie des larves d'*Anopheles maculipennis*. [**On the Rôle of the Reaction of the Medium in the Ecology of *Anopheles maculipennis Larvae*.**]—*Ibid.* pp. 39-43. With 1 text fig. [4 refs.] [Trop. Inst., Moscow.]

These two papers merely emphasize the facts already explained above (p. 298).

A. A.

SHANNON (Raymond C.). O aparecimento de uma especie africana de anopheles no Brasil. [**An African *Anopheles* found in Brazil.**]—*Brasil-Medico.* 1930. May 10. Vol. 44. No. 19. pp. 515-516. [Yellow Fever Lab., International Health Division, Rockefeller Foundation, Bahia, Brazil.]

The author, who works in the Yellow Fever Laboratory in Bahia, was making a mosquito survey in Natal, Rio Grande do Norte [N. of Pernambuco] in March this year. In one inundated district near Rio Potengy where there were no fish, he found hundreds of nymphs and larvae of a mosquito not known in South America, and which proved to be *A. costalis*. This identification was confirmed by N. C. DAVIS.*

H. H. S.

MARZINOWSKY (E. I.) & SCHOURENKOVA (A.). Sur le *Phlebotomus caucasicus* Marz. [**On *Phlebotomus caucasicus* Marz.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 10. pp. 671-674. [4 refs.] [In French. Russian summary. With 4 text figs. 3 refs.]

The French summary explains at some length (1) that the *Phlebotomus* *i* described and figured, in 1926, as a new species, by POPOFF, is identical with (and therefore becomes a mere unfortunate synonym of) the *Phlebotomus caucasicus* described by Marzinowsky in 1917; and (2) that the "*Phlebotomus caucasicus*" redescribed and figured by POPOFF (1926) is identical with the *Phlebotomus sergenti* of PARROT (1917). [According to NEWSTEAD the *Phlebotomus caucasicus* of Marzinowsky also is identical with the *P. sergenti* of PARROT.]

A. A.

* Confirmation of this discovery will be awaited with interest.—Ed.

SCHOURENKOVA (A.), DEMINA (N.) & PAVLOVA (P.). **A Simple and Rapid Method of the Identification of the Females of Phlebotomus.**—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 10. pp. 675–686. With 28 figs. on 4 plates. [In Russian. English summary pp. 687–688.]

The features of the spermathecae are brought out by treatment with lactic acid. Specimens of *Phlebotomus* that have been preserved in alcohol are transferred from alcohol to pure lactic acid for 4 to 24 hours; the terminal segments of the abdomen are then cut off and transferred in the lactic acid to a slide for permanent mounting under a cover-glass; very cautious heating of the slide hastens visibility. Dried specimens can be treated in exactly the same way after they have been soaked in 95 per cent. alcohol, as also can specimens that are mounted in balsam, after they have been dismounted by xylol and washed with spirit.

A. A.

GRAHAM-SMITH (G. S.). **Further Observations on the Anatomy and Function of the Proboscis of the Blow-Fly, *Calliphora erythrocephala* L.**—*Parasitology*. 1930. Jan. Vol. 22. No. 1. pp. 47–115. With 4 plates & 36 text figs.

This is a detailed description, well illustrated, of the anatomy of the proboscis of the common blow-fly and of the functions of the structures found in it, attention being emphasized on the fact that the fly can feed in several ways: it can filter larger particles out of liquid food, or can scrape chosen surfaces moistened with vomit or saliva with its prestomal teeth, and afterwards ingest the emulsion so produced, or can suck up thick sputum (or faeces) containing helminth eggs without intervention of its filtering apparatus or teeth. The relation of these modes of feeding to infection is very briefly indicated by descriptions and figures.

A. A.

BRANDAU (George M.). **Rhinal Myiasis.**—*Amer. Jl. Med. Sci.* 1930. May. Vol. 179. No. 5. pp. 643–653. [30 refs.]

The author prefaces summaries of two typical cases of that infestation with a good epitomized account of rhinal myiasis—its aetiology, symptoms, complications, and treatment—concluding with a very useful bibliography. The very serious and destructive complications that may occur if the ravages of the maggots are not checked in good time are mentioned; YOUNT and SUDLER (*Journ. Amer. Med. Assoc.*, 1907, 1912) “in a series of 23 cases of myiasis [give] a mortality of 22 per cent in 18 nasal cases.” Various methods of treatment are reviewed. Persons suffering from ozoena due to any chronic nasal disease should be warned of the dangers of rhinal myiasis and of sleeping in the open. Apart from treatment of symptoms and of destructive lesions the immediate treatment is to remove the maggots, partly by mechanical means (forceps, antiseptic irrigations, etc.) partly by larvicidal vapours or injections, continued from time to time until all the maggots have been cleared out. Pledgets soaked in chloroform may be placed in the nostrils and left for 5 minutes, or the nasal passages may be washed out with a 20 to 25 per cent. dilution of chloroform or ether in milk or olive oil.

Of the 2 cases reported, No. 1 was in a negro youth who ejected a dead fly from his nose some days after he had slept out in the open. Perforation of soft palate and nasal septum occurred before all the [uncounted]

maggots (*Cochliomyia macellaria*) were removed—by nasal irrigations first of ether 50 per cent. solution in olive oil, subsequently of chloroform in milk. Case No. 2 was of a boy who began to suffer from nasal irritation a few days after a fly had flown into his nose when he was riding. Maggots [unidentified] to the number of 170 were discharged or removed, by irrigation with 20 per cent. dilution of chloroform in milk. Some intranarial erosion and a copious bleeding from the nose occurred. Treatment in both cases was successful.

A. A.

CHESNEAU (Pierre) & TRAN-VAN-MANH. Rhinomyiase à *Chrysomya bezzianum* [sic]. [**Rhinomyiasis by *Chrysomya bezziana*.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1929. Aug.-Sept. Vol. 7. Nos. 8-9. pp. 410-413.

This case exhibited the well known symptoms and signs of myiasis of the nasal passages—intractable frontal headache and paroxysms of sneezing soon succeeded by inflammatory oedema extending to the brows and cheeks, and a sanious foetid discharge from the nostrils. Examination disclosed the presence of maggots, perforation of the nasal septum and other evidence of local destruction, and perforation of the palate and escape of maggots into the mouth. By means of chloroform inhalations, free flooding of the nasal passages, and the use of forceps, 65 maggots were removed (in addition to those that escaped), and by the 9th day all the larvae had been expelled and the symptoms were abated. Maggots kept for observation pupated on the 10th day and hatched 13 days afterwards. The flies were determined by ROUBAUD as *Chrysomya bezziana*.

A. A.

PILKINGTON BROTHERS LTD. **Coloured Glass as a Deterrent to House Flies.** [Correspondence.]—*Nature*. 1930. Apr. 5. Vol. 125. No. 3153. p. 529.

Pilkington Brothers Ltd., of the Crown Glass Works, St. Helens, Lancashire, in recent experiments in this subject found that—everything else being equal—red and yellow glass are good deterrents of houseflies, yellow in particular being “very effective” in connexion with the storage of food.

A. A.

NEWSAD (A.). Sarcopotesmilben auf den Stubenfliegen. [**Sarcoptes on Houseflies.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. July. Vol. 34. No. 7. pp. 399-400.

In the course of examining houseflies for a set purpose the author observed on the abdomen of one of them (that had been kept in a clean vessel for 3½ weeks) a living adult “Sarcoptes-mite.” Thereupon he searched about a hundred more houseflies, all bred in the laboratory, and found on one of them a “Sarcopteslarva.” The laboratory lies about 50 metres from a Veterinary clinic, and about 100 metres from a medical clinic and a cavalry depot.

A. A.

TANGANYIKA TERRITORY. **Tsetse Research Annual Report for the Year ended 31st March, 1929** [SWYNNERTON (C. F. M.), Director of Tsetse Research.]—18 pp. Dar Es Salaam. [2s. 6d.] [n.d.]

Early in 1925 a large-scale investigation of the question of controlling cattle tsetse-fly in East Africa, independent of the Medical organization

at Entebbe and the Veterinary centre now working at Mpwapwa, was recommended. A Director and three officers were appointed, but arrangements for financing the business were not effected until 1927-28. It was agreed from the first that the basis of the control must be oecological.

This, the first report of the new-formed Department of Tsetse Research, is concerned with work of an introductory nature only.

The Department is administered by a Director, Mr. C. F. M. Swynnerton, a Deputy Director and Oecologist, 2 Zoologists, 2 Entomologists, 2 Botanists, and 4 officers seconded to the Research Staff from the sub-department of Tsetse Reclamation.

The Headquarters of the Department are at Kondoa-Irangi (4,500 ft) in the Central Province. The Research Stations are: (1) *Sambala* (4,900 ft.) in the Kondoa District, Western Fly-belt; where an entomologist, a botanist, and a zoologist are stationed, and opportunities are favourable for studying relations between game and *G. morsitans*. (2) *Kikori* (4,250 ft.) with an entomologist and zoologist, where *G. morsitans* is abundant and the distribution and behaviour of game are remarkably different from Sambala. (3) *Itundwe* (4,300 ft.) with an oecologist, where the conditions of climate and soil are (as at Kikori) suitable for observations on experimental poisoning of vegetation and planting of vegetation inimical to tsetse. (4) *Salanga* (5,400 ft.) on the Masai Scarp, which is representative of the greater part of this scarp and has relict patches of evergreen sub-tropical forest suggestive as barriers to tsetse. The 3 last stations are all in the Eastern Fly-belt at the base of the Masai scarp.

Since the research was planned from the first as to be essentially *oecological* it is—apart from its rather overwrought terminology—plainly a prolonged biological study, and has so been distributed at the different Research Stations under the following heads: (1) Reconnaissance, mapping of vegetation, tsetse, and game distribution. (2) General observations of fly in relation to season, weather, vegetation, game and man. (3) Biological environment of *G. morsitans*. (4) Physical and physiographical environment of *G. morsitans*. (5) General relations of *G. morsitans* and game; e.g., preference of the fly for any particular species of game. (6) Alteration of oecological environment as means of control of *G. morsitans*; e.g., investigating utility of dense evergreen shade trees, or the reverse; or effect of killing particular trees; or effect of particular clearances; or of absence of thorny growth inimical to tsetse or game. (7) Direct and Indirect influence of fire in control of fly or its breeding-grounds. (8) Biological control, e.g., study of parasites of puparia. Only one parasite has yet been found, namely the Bombyliid fly *Thyridanthrax abruptus*. (9) Making and arrangement of collections—plants, insects, birds.

As is stated in the conclusion, an encouraging beginning has been made and much interesting experience gained, but for more pregnant experiences and more satisfying results the future must be trusted.

A. A.

TANGANYIKA TERRITORY. Tsetse Reclamation Annual Report for the Year ended 31st March, 1929 [SWYNNERTON (C. F. M.), Director of Tsetse Reclamation].—10 pp. Dar Es Salaam. [1s. 6d.] [n.d.]

The Tsetse Reclamation annual report to March 31st, 1929, reminds us that work was begun in Shinyanga, in 1923, against *Glossina*

swynnertoni and was extended later against continuous advances of *G. morsitans* to Nzega, Mwanza, Kondoa, Manyoni and Singida. Reclamation officers are now at work in all those districts carrying on fresh reconnaissances; assisting in research, e.g., making roads, fire-breaks, and erecting camps; mapping the threatened invasion of fly-free territory; and assisting in the reclamation of infested districts. Details of advances of fly are given in most of the districts named. The questions to be answered are: Can an annual turn out of the natives, *en masse*, against tsetse be assured as a tribal custom? Would the natives settle in an area thus prepared for reclamation? Could effective grass-fires be organized and would they dispose of the tsetses either directly or by destroying bush? In Mwanza and Tabora these questions are answered in the affirmative; in Shinyanga the annual turn out of natives against fly is an acknowledged custom; in Lubaga natives are duly settling in the areas cleared by axe and grassfires where infested blocks have been cleaned by departmental fires deferred till September or late August and kindled on a broad front in hot windy weather. The discovery in Singidi-Manyoni of a continuous thicket, 70 to 80 miles long, unattractive to *G. morsitans* and prohibitive to man and to most game except on elephant paths is an outstanding find. Living game-fences, at £17 1s. 3d. per mile, have proved useful. Clearing or burning, and attack on advanced haunts of fly—as in Kondoa and Silia have had obvious good effect. In Shinyanga and several other districts clearings of infested areas are being not only grazed, but also settled by natives. Naturally not *all* large clearings are equally amenable to native settlement, even when they are known to have stopped invasions of fly. Two-fifteenths of a shilling, including supervision, appears to be the approximate cost per acre of actual felling, piling, and burning “bush,” and the rate promises to go towards one-sixteenth of a shilling.

A. A.

RHODESIA, Southern. Report of the Secretary, Department of Agriculture, for Year 1929.—(Medical and Veterinary. Tsetse Fly pp. 46–50).

As the local fly-front in all its windings measures 600 miles and the resources of the colony are not unlimited, attempts to control fly have to be concentrated at present on places here and there where fly is known to be openly advancing or to be causing loss to graziers. The efforts here most approved are wide belts freed and fenced from game. In the Lomagundi district there are now, with recent additions, 120 miles of such fences to be maintained; here, although the health of cattle in the protected tracts is generally improved, and the numbers of flies in the newly fenced area is said to be very greatly reduced, cattle disease is not yet suppressed. In the Gatooma district, where some check has been exercised by game-fencing, the great abundance of wart-hogs hinders control. In the Wankie district special inspections show spreading of fly. On the Portuguese frontier the Sabi River valley seems to be free of fly, but in certain other places *G. pallidipes* and *brevipalpis* were abundant.

Attention has been given to study of specific forest characters in relation to records of the past distribution of fly in the colony. Legislation for control of traffic from fly zones has been effected and is about to be enforced. Study of parasites of muscoid flies has been pursued.

A. A.

SCHWETZ (J.). **Some Ecological Notes on *Glossina newsteadi* Austen.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 211–216. With 1 map in text. [1 ref.]

Glossina newsteadi occurs normally with *G. palpalis* on the banks of rivers, but is also found with *G. fusca* and *tabaniformis* at a distance from water; it is active chiefly in the morning and the evening, but is sometimes caught in broad daylight. It is here said to be distinguished from most species of the *palpalis* group by its bigger size and lighter colour—points which, according to Major AUSTEN, are not obvious in pinned specimens.

A. A.

PANDIT (C. G.), GEORGE (P. V.), MANKIKAR (D. S.) & NATARAJAN (N.). **A Rat-Flea Survey of the Madras Presidency. Reports IV, V and VI.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1223–1257. With 2 maps & 2 charts in text.

Statistics and local commentary of rat-flea surveys of towns in S. India.

(1) Ootacamund and neighbouring village of Ketti, in May–June. Rodents, etc., examined, 212: *Mus rattus* 125, *Gunomys kok* (also a field rat) 61, the rest house-mice, “bandicoots,” and musk-rats. Fleas collected from them, 427; *Xenopsylla cheopis* 49 per cent., *Ceratophyllus* sp. 22·6 per cent. (most on *Gunomys kok*), *X. brasiliensis* 14·5 per cent., *X. astia* 9·7 per cent., *Leptopsylla musculi* 3·7 per cent., and one specimen of *Pulex irritans*.

(2) Madras, in July–August. Rodents, 1,025: *M. rattus*, 1,002, all the rest bandicoots, no mice. Fleas, 2,766: *X. astia*, 2,608; *X. cheopis*, 154; *X. brasiliensis*, 2; *P. irritans* and *Ct. felis*, one of each.

(3) Saidapet (5 m. from Madras), in March–April. Rodents, 378: *M. rattus*, 367, all the rest bandicoots. Fleas, 1,179, all *X. astia*.

(4) Negapatam, in June–July. Rodents, etc., 466: *M. rattus*, 456, the rest bandicoots and 1 musk-rat. Fleas, 1,680, all *X. astia*.

(5) Nellore, in April–May. Rodents, 1,047, all except 4 bandicoots being *M. rattus*. Fleas, 3,398; *X. astia*, 2,740, and *X. cheopis* 658 (chiefly in graindealers' shops and houses).

(6) Tirupati and Tirumalai, important centres of pilgrimage. Rats, “usual high density in bazaar areas” [species not recorded]. Fleas 793, all *X. astia*.

(7) Tanjore, in April. Rodents, 756: *Mus rattus*, 699; *M. norvegicus* (provisionally identified) 46; the rest bandicoots. Fleas, 2,405, all *X. astia* except one *Ct. felis*. In investigating the question of possible infestation of imported grain-bags with rat fleas or their larvae, 26 samples of grain and sweepings were examined at Tanjore. In no case were any adult fleas discovered in the fresh samples, but in three instances samples gave issue to adults (altogether 4 individuals) of *X. astia* in about 4 weeks.

A. A.

WASSILIEFF (A.). **Recherches sur l'épidémiologie pesteuse au Sénégal, en 1929. Les réservoirs de virus.** [The Epidemiology of Plague in Senegal in 1929. Reservoir Hosts.]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 737–747. [3 refs.]

After plague started in Senegal, in 1929, about 10,000 rats were examined in the course of 10 months, but only six were recognized as infected, 2 of them at the onset and 4 in the full tide of the epidemic. It is true that the inhabitants of two villages spoke of “rats dying en

masse," but whether this occurred before or during the epidemic could not be ascertained. It is on this basis that the author declares that the precept "first the epizootic, then the epidemic" was not confirmed, and concludes that in Senegal "the plague was interhuman." The rodents caught in the bush were mostly *Mus rufinus* and *Golunda campaneae*. In some villages *Mus rattus* predominated. The rat-fleas were constantly and almost exclusively *Xenopsylla cheopis* and (in the neighbourhood of fowl-houses) *Echidnophaga gallinacea*. In one village only *X. astia* was found in May, and it in September had been "replaced by *X. cheopis*." Gravid females of *X. cheopis* were particularly numerous in April-May; May-June, when the humidity in the rat-runs was 75°-80°, was their season of increase; later on, when that humidity was increased to 90°-98° neither rats nor fleas were to be found in the runs. The author's "General Considerations" are not so nicely consistent with his preliminary statements as one could wish; for although he maintains that the first cases of plague in Senegal were not preceded by an epizootic in rats, he thinks it possible that the plague bacillus might exist in an "invisible form" in rats, and he admits that there must be a link between the plague of wild rodents and plague in man and that the domestic rat is that link. This makes it necessary to seek the actual reservoir of the virus elsewhere; and from the abundance of *X. cheopis* in Senegal and the fact that fleas are long-lived insects the author thinks it possible that fleas may be reservoirs. He recommends also that the search for a reservoir should include not only wild species of rodents, but also hedgehogs, shrewmice, jackals, etc. Finally, he cites a case, reported by NIKANOROFF, of a Kirghiz with a chronic infection of plague who was an actual carrier of the disease, and he thinks that human cases of the same sort, coupled with the presence of thousands of fleas, may explain the outbreaks of plague in Senegal.

A. A.

WASSILIEFF (A.). Observations sur les puces de la région du Cayor, (note préliminaire). [On the Fleas of the Region of Cayor.]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 474-478. With 1 text fig. [1 ref.]

As a flea-trap the author used a saucer full of oil with a lighted wick, or else a saucer full of weak chloroform-water. The commonest flea of Cayor (Senegal) is *Xenopsylla cheopis*. *X. astia* occurs, but is rare, also *Ctenocephalus canis*. *Echidnophaga gallinacea* may be found in hundreds on a single rat. *Pulex irritans* has never been seen at Cayor.

A. A.

DEMARIA (Alfredo) & GALLINATO (Valentin). Pulgas de las ratas de la costa Sur-Occidental de Sud-América. Nota preliminar para el estudio de la distribución y epidemiología de la peste en Chile. [Rat-Fleas of the South West Coast of South America. Preliminary Note on the Epidemiology of Plague in Chile.]—*Rev. del Inst. Bact. de Chile*. Santiago. 1929. Vol. 1. No. 1. pp. 35-39. With 4 figs.

In Santiago in the summer of 1928 and 1929 the average number of rat-fleas per rat was 12.6, and the relative percentages 35.5 *X. cheopis*,

28.8 *Sarcopsyllidae*, 16.9 *Leptopsylla musculi*, and *Pulex irritans* and *Ctenocephalus canis* 3.6 each. Of 893 fleas from 91 rats in port Valparaíso in the autumn of 1929 the relative numbers were 46.6 *Ceratophyllus fasciatus*, 42.9 *Leptopsylla musculi*, 6.4 *Pulex irritans*, 3.1 *Sarcopsyllidae* and 1 *X. cheopis*. On one rat captured in Alameda there were 60 *X. cheopis*, 13 *Ceratophyllus fasciatus*, and 7 *Leptopsylla musculi*. The author concludes that in Chile there are limited foci for development of plague, which has not invaded the northern part of the country owing to the Andes being a natural barrier and to the fact that the rats of coasting vessels harbour relatively few *X. cheopis*.

H. H. S.

CARRION (A. L.). **Third Report on a Rat-Flea Survey of the City of San Juan, Porto Rico.**—*Porto Rico Jl. Public Health & Trop. Med.* 1929. Dec. Vol. 5. No. 2. pp. 158–166. With 7 charts. Also in *Public Health Repts.* 1930. July 4. Vol. 45. No. 27. pp. 1515–1520. With 7 charts.

During the twelve months ending with June, 1929, the number of live rats trapped in San Juan was 249, the Norwegian rat predominating. Fleas were found in 68 per cent.; the flea-index being 7.9 and the *cheopis*-index 7.7. A few specimens of chigger, dog or cat flea, and *Pulex irritans* were caught.

A. A.

IOFF (I.). **Materialien zum Studium der Ectoparasitenfauna im Süd-Osten der U.d.S.S.R. V. Flöhe der Springmäuse (Dipodidae). VI. Flöhe der Blindmäuse (Spalacidae). VII. Die Flöhe der Steppenitisse. [Materials for a Study of the Ectoparasite-Fauna of the S.E. Union of Soviet States. V. Fleas of Jerboas. VI. Fleas of Spalacidae. VII. Fleas of the Weasel of the Steppes.]**—*Berichte des Mikrobiologischen Staats-Instituts z. Rostow am Don.* 1929. Aug. No. 8. pp. 1–52. With 18 figs. [Numerous refs.] [In Russian script. German summaries pp. 53–60.]

Several papers, by this author and collaborators, on the fleas parasitic on rodents and other small mammals of the steppes of S.E. Russia and W. Asia have been noticed in this *Bulletin* (Vol. 23, p. 873; Vol. 24, pp. 434, 894; Vol. 25, p. 286). The present papers, which are almost entirely taxonomic, appear to be a revision of some of them. They deal with the fleas of Jerboas (Dipodidae), mole-mice (Spalacidae) and the weasel of the steppes (Putorius). In the Russian version many of the species are redescribed, or characterized, and their taxonomic features figured.

A. A.

SIKES (Enid K.). **Larvae of *Ceratophyllus wickhami* and Other Species of Fleas.**—*Parasitology.* 1930. Mar. Vol. 22. No. 2. pp. 242–259. With 7 text figs. [33 refs.] [School of Hyg. & Trop. Med., London.]

An admirable critical summary of writings on flea-larvae, beginning with the famous LEEUWENHOEK (1683) who tried to breed fleas, forms the preface of this paper, and a useful attempt has been made also to furnish a complete list of references to the anatomy of flea-larvae.

The life-history of *Ceratophyllus wickhami* (from the N. American grey squirrel) is described; three larval instars occur and the life-

history under experimental conditions takes on an average 6 weeks ; the external anatomy of the larva is described, that of the third instar in great detail. Brief notice is taken of the larvae of *Xenopsylla cheopis* and *X. astia* ; the two "are practically identical except for the shape of the mandibles."

A. A.

STILES (C. W.) & COLLINS (Benjamin J.). **Ctenocephalides, New Genus of Fleas, Type *Pulex canis*.**—*Public Health Rep.* 1930. June 6. Vol. 45. No. 23. pp. 1308–1310.

"The generic name *Ctenocephalus* Kolenati, 1859 . . . applied to certain well-known fleas, is preoccupied by *Cterocephalus* Hawle and Corda, 1847. . . . a well-known trilobite, and, under Art. 34 of the International Rules, must be rejected as an absolute homonym." So the authors have discovered, who now propose the new name *Ctenocephalides* for the fleas at present improperly styled *Ctenocephalus*, and give their reasons for appointing the dog-flea, *Pulex canis* Curtis, 1826, the type of the new genus. (Incidentally the authors indicate how much more deeply preoccupied is the name "*Ctenocephalus*" (type *C. tiara*) applied by Linstow 1904 to a nematode worm.)

A. A.

FAUST (Ernest Carroll) & MAXWELL (Thomas Andrew). **The Finding of the Larvae of the Chigo, *Tunga penetrans*, in Scrapings from Human Skin. Report of a Case.**—*Arch. Dermat. & Syph.* 1930. July. Vol. 22. No. 1. pp. 94–97. With 6 text figs. [3 refs.] [Med. School, Tulane Univ. of Louisiana, & Charity Hosp., New Orleans.]

In scrapings from the skin, of the pubic region and its vicinity, of a native resident of New Orleans who had recently been infested with chiggers (*Tunga penetrans*) from a cargo of hemp imported from Yucatan, there were found some hundreds of small moving objects which proved to be chigger-larvae ; they were in an advanced stage ; many of them were thriving, and some were full of blood.

A. A.

HASE (Albrecht). Weitere Versuche zur Kenntnis der Bettwanzen *Cimex lectularius* L. und *Cimex rotundatus* Sign. (Hex.-Rhynch.) Beiträge zur experimentellen Parasitologie 4. [Further Contributions to Knowledge of the Bedbugs *Cimex lectularius* L. and *Cimex rotundatus* Sign. Contributions to Experimental Physiology 4.]—*Ztschr. f. Parasitenk.* 1930. Jan. 25. Vol. 2. No. 3. pp. 368–418. With 9 text figs. [2 pages of refs.]

This dissertation treats of the two notorious species of bedbugs, with occasional references also to *Oeciacus vicarius* and *Conorhinus megistus*. After a long description of an inexpensive and easy method of keeping the insects fed upon mice in the laboratory, the argument becomes chiefly physiological and is concentrated on the nature of the aliment imbibed and of the solid and liquid excreted, and of certaiu

conditioned circumstances (mainly of temperature) that affect the mortality of the eggs and larvae. In respect of the aliment the author's observations of distended bugs and of bug-excreta point to the conclusion that these insects (like other blood-sucking arthropods) often feed on lymph, or a mixture of blood and lymph, instead of pure blood. About ten pages are devoted to a study of the colour-variations observed in the solid excrement and to the liquid passed after the process of suction. The colour-variations are influenced not only by the quality of the aliment and the activity of the digestive glands, but also by temperature, by moulting, and by age. The observed effects of all these influences upon the excreta are separately and severally described. A study of the effects of temperature on the vitality of eggs and the rate of output of larvae showed that *Cimex rotundatus* needs more warmth than *C. lectularius*, since by exposure for 2 hours to a temperature of -15° [$^{\circ}$ C.] all the eggs of *rotundatus* were killed, whereas 24 per cent. of those of *lectularius* survived, and again at the other extreme of 25° [$^{\circ}$ C.] the output of larvae was longer continued for *rotundatus* than for *lectularius* (though shortened for both species at 30°). After long exposure (35 days) to a temperature (2° C.) near freezing-point, about 5 per cent. of *lectularius* eggs hatched, and after still longer exposure to this low temperature the number of still-births became stationary (nimmt die Zahl der "Totgeburten" stetig zu); so that the author permits himself to say that "by these considerations a zero of development is a physiological impossibility"—which is "an absolute biological knock-out." In the long list of references, which fills more than a page and a half, only 3 (PIKKEL 1898, PATTON 1907, and PATTON & CRAGG 1913) are anterior to 1914.

A. A.

RIVNAY (Ezekiel). **Technique in Artificial Feeding of the Bed Bug, *Cimex lectularius* L.**—*Jl. Parasitology*. 1930. June. Vol. 16. No. 4. pp. 246-249. With 3 text figs. [4 refs.]

In numerous artful experiments for feeding bed-bugs the author found that *heat* was what excited the hungry insects to examine an inanimate object, and that a moist or a too smooth surface (and, of course, a distasteful smell) completely curbed their appetite. In his successful experiments he stretched and fastened a tender piece of chicken-skin (scraped quite free of fat, etc.) as a drumhead to one end of a piece of glass tube. The outer surface of the drum was then carefully *dried* with blotting-paper. Various *warm* solutions (e.g., chicken broth, chicken blood-serum, weak syrup) were then poured into the tube, which was offered to the bugs. Both young ones and adults fed full on them all through the warm, dry, hospitable chicken skin. [What the author claims as novel is the heating of the artificial food.]

A. A.

KEILIN (D.) & NUTTALL (G. H. F.). **Iconographic Studies of *Pediculus humanus*.**—*Parasitology*. 1930. Jan. Vol. 22. No. 1. pp. 1-10. With 18 plates. [23 refs.] [Molteno Inst. for Research in Parasit., Cambridge.]

The plates here published (I-XVIII), all but two of which relate to *Pediculus humanus* race *corporis*, are described as fragmentary in character,

though recording certain anatomical features in *Pediculus* not hitherto observed. The mouth-parts are not described, references being given to papers by HARRISON (1916), SIKORA (1916), and PEACOCK (1918). The name *corporis* de Geer (1778) is established as having priority over *vestimenti* Nitzsch (1818), and *Phthirus* (not *Phthirius*) as the generic name established by LEACH.

A. A.

- V. MALLINCKRODT-HAUPT (Asta). Milbenerkrankungen beim Menschen. Ein neuer Trombidioseherd in der Eifel. [**Mite-Diseases in Man. A New Focus of Trombidiasis in the Eifel District.**—*Dermat. Ztschr.* 1929. June. Vol. 56. Nos. 2/3. pp. 98-109; Nov. Vol. 57. No. 3. pp. 191-201; 1930. Mar. Vol. 58. No. 1/2. pp. 24-34. With 2 text figs. [Bibliography.]

The introductory first instalment of this paper is a compilation which entertains under their specific names and in their several family alliances, and mainly from the standpoint of the dermatologist in Europe, certain well-known mites that attack the sons of toil in all sorts of agricultural and horticultural occupations and those who handle sundry agricultural merchandize, divers foodstuffs, and other various dry-goods on a large scale. It deals with these mites (*Tyroglyphidae*, *Gamasidae*, and *Tarsonemidae*) on their clinical and (discursively) on their micropathological record, and not as material for biological or taxonomic study. The second and third instalments of the paper deal almost exclusively with the Trombidiid larva *Trombicula autumnalis* (the well-known "harvest mite"), and are prefaced by an account of eight cases of trombidiasis observed at Trier in the Eifel district of Rhenish Prussia.

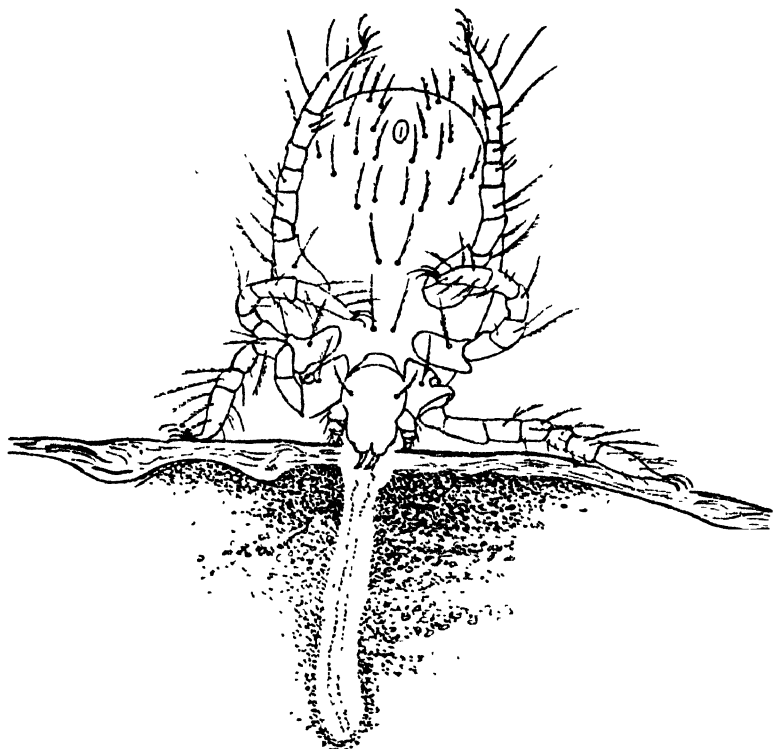
Under *Tyroglyphidae* are mentioned some of the food-mites and grocers' itch mites in the respiratory tract said to cause asthma, and *Rhizoglyphus*. The *Gamasidae* mentioned are the species of bird-mites (*Dermanyssus*) that sometimes attack keepers of poultry and cage-birds. The five pages on *Tarsonemidae* are taken up by *Pediculoides ventricosus* and the alarming exanthem-like epidemics caused by it in many parts of the world among people handling straw, grain, seeds, copra, and other such commodities. The papers on *Trombidiidae* take summary notice of typhus-like tropical infections spread by *Trombicula* larvae and are otherwise formally devoted to the European harvest mite (*T. autumnalis*), its well known provenance and seasonal prevalence, the clinical phenomena and histopathology of the rash it causes, and the symptoms, diagnosis, and prognosis of trombidiasis. A copious bibliography of the families reviewed is appended.

A. A.

- VITZTHUM (H. Graf). Systematische Betrachtungen zur Frage der Trombidiose. [**A Systematic Account of Trombidiasis.**—*Ztschr. f. Parasitenk.* 1929. Oct. 12. Vol. 2. No. 2. pp. 223-247. With 7 text figs. [2 pages of refs.]

This is a good compilation, with a good bibliography, on trombidiasis, the distracting itch caused by various species of *Trombicula* larvae [commonly known in England as "harvest-mites" and in N. America as "chigger mites"—not to be confused with chigger fleas]. The

natural history of the *Trombicula* larva is described, the nature of trombidiasis is discussed, and the individual species implicated, with their respective synonyms and geographical distribution, are passed in review. Good figures are given (one of them reproduced from ANDRE) of the stylostome—the long suctorial tube, formed by the salivary secretion, by means of which the larva penetrates the skin of the host and disintegrates and digests the surrounding tissue. GUDDEN (1871, *Arch. f. Path. Anat. & Physiol.*) first observed, but did not explain, this tube. JOURDAIN (1899, *Archiv. de Parasitol.* Vol. 2, No. 1 and No. 3) who coined the name "stylostome," discovered its nature



Larva of *Trombicula autumnalis* shortly after beginning to suck blood, showing the stylostome formed by the salivary secretion.

[Reproduced from *Zeitschrift für Parasitenkunde.*]

as a temporary tube the wall of which is formed of solidified secretion from the mouth, and as becoming detached and left in the tissues of the host when the replete larva quits its hold. ANDRE (1927, *Bull. du Mus. d'Hist. Nat. Paris.* Vol. 33, pp. 509–515, with 2 text figs.) describes and shows how the larva, having fixed itself into the cuticle of its host by its mandibles, ejects a salivary or venomous secretion that penetrates and diffuses into, and profoundly modifies, the tissues beneath the cuticle, and also forms the stylostome. In the lumen of the stylostome fine granules of digested matter can sometimes be seen—evidence of an extra-visceral digestion.

NIESCHULZ (Otto) & WAWO-ROENTOE (F. K.). Ueber die Zucht von Zecken. [**On rearing Ticks.**].—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 20. Vol. 115. No. 7/8. pp. 486–488. With 1 text fig. [1 ref.] [Inst. for Infectious Diseases & Parasitology, Utrecht.]

A method of feeding ticks (particularly nymphs and larvae) on experimental animals (particularly guineapigs and mice) is described. An oblong piece of fine soft cambric is cut to fit an area on the animal's back, the area intended having been clipped—not shaved. The cambric is then affixed (by collodion) at its edges, on three sides, to the animal's back, the larvae (or nymphs) are introduced beneath it, and the fourth side is then closed by sticking. A stiff broad sort of Gladstonian collar of stiff cardboard is then fastened round the animal's neck; it can now neither scrape the tiny ticks off nor bite them when they swell, nor can the ticks escape, although they tend to collect at the edge of the cambric shield. The animal thus bedecked can now be left for two days in the ordinary way in a gauze-covered glass jar, until the larval ticks are replete; holes must then be cut in the cambric shield to let them escape. They tend to collect on the gauze top of the jar, where they can be captured individually and separately confined—for further requirements.

A. A.

TALICE (R. V.). Etude histologique de la piqure de *Dermacentor reticulatus* (Fabricius, 1794). [**Histological Study of the Bite of *Dermacentor reticulatus* (Fabricius).**].—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 173–178. With 6 text figs. & 2 figs. on 1 plate. [5 refs.] [Parasit. Lab., Faculty of Med., Paris.]

A well illustrated account of the effects of the bite of *Dermacentor reticulatus* as studied in sections of the skin of the ear of the hedgehog. No stylostome is formed. The mouth-parts penetrate into the true dermis, causing not only a superficial epidermatitis but also a deep haemorrhagic dermatitis.

A. A.

SOFIEW (M. S.). *Ornithodoros lahoriensis* (Neumann 1908) in Usbequistan. [*O. lahoriensis* in **Uzbekistan.**].—*Pensée Méd. d'Usbequistane et de Turquemenistane.* Tashkent. 1929. Nov.–Dec. No. 2/3. pp. 18–21. With 2 text figs. [12 refs.] [In Russian script. German summary p. 146.]

The author signifies the existence of *Ornithodoros lahoriensis* in Uzbekistan as a fact of importance considering that the question of the carrier of the Persian type of relapsing fever is still unsettled.

A. A.

SINCLAIR (C. W.). **A Fatal Tick Bite.**—*Med. Jl. Australia.* 1930. Apr. 26. 17th Year. Vol. 1. No. 17. p. 554.

The victim here was a delicate little girl of 3½ years. The (unspecified) tick was found fixed in the left parietal scalp (and removed) about four days after its probable invasion. There was local swelling at the site of fixure and the gait was unsteady. Paralysis of both legs and of sphincters was complete on sixth day, with loss of lower reflexes, and, later, paralysis of fauces. Death sudden, early in seventh day.

A. A.

FRANCHINI (Giuseppe). Distribuzione degli Ixodidi nelle nostre colonie Eritrea. [**Ticks in Eritrea.**—*Arch. Ital. Sci. Med. Colon.* 1929. Nov. 1. Vol. 10. No. 11. pp. 540–543. With 1 map in text. English summary. [Inst. of Trop. Path., Univ., Bologna.]

The author presents a spot map for twelve species including (new to the colony) *Rhipicephalus evertsi*.

H. H. S.

ENGINEERING NEWS RECORD. 1930. July 24. Vol. 105. No. 4. pp. 129–130. With 5 text figs.—**Mosquito Control at Saluda Dam.**

The Saluda Dam, situated in South Carolina, is nearly $1\frac{1}{2}$ miles in length at crest level, the length of the reservoir being 35 miles and varying in width up to 14 miles. The very irregular shore line is over 500 miles in length and the surface level alters constantly owing to draw-offs. During several months of the year conditions are peculiarly favourable for mosquito life. Larvae of all types feed near or at the surface close to the shore line, and it is possible to kill them by spraying oil on the water to a few feet out from that line. Where dense growths of vegetation occur effective oil distribution is difficult at times and Paris green is blown over the surface to reach the places inaccessible to the oil-spraying equipment. Local experience has shown that it is necessary to destroy the larvae once a week, but the whole 500 miles of shore line have not to be considered because wind causes sufficient wave action along extended stretches to prevent larvae propagation. A large barge provides quarters for the control crew, space for supplies and a laboratory. Working out from this floating base are three small power boats from which the spraying is done. The small boats have a 3 h.p. out-board motor, a 4 ft. beam and an overlength of 18 ft. Each boat is equipped amidship with an air-cooled petrol engine directly connected to a centrifugal pump of 2-in. suction and discharge. Oil is fed into the suction by gravity through a $\frac{1}{2}$ -in. line from a 50 gal. drum placed aft in the boat. The pump delivers through a short section of hose fitted with a $\frac{1}{2}$ -in. nozzle. The average proportion of oil to water is about 1 to 100. The pump throws a stream 60 to 80 ft. from the boat which will reach most of the shore line areas while the boat travels along in clear water. The equipment for dusting Paris green on stretches that cannot be reached effectively with the hose stream consists simply of a $\frac{1}{2}$ -in. motor-driven portable blower. A portable petrol-generator unit that ordinarily supplies current on the barge is shifted to one of the boats to drive the blower. The Paris green, mixed 5 parts to 100 parts of hydrated lime, is drawn dry by the suction of the blower from a hopper mounted in the boat. One of the main objections to the Paris green treatment is that it must be repeated after every rainfall. The apparatus used for spraying oil is effective, except where the vegetation is unusually dense or there are large trees.

H. Home.

AMERICAN JOURNAL OF PUBLIC HEALTH. 1930. June. Vol. 20. No. 6. pp. 628–632.—**Improved Practical and Economical Methods of Mosquito Control. Report of the Committee on Mosquito Control** [JACKSON (Lewis E.), Chairman].

The Committee on Mosquito Control undertook experiments with oils and oil mixtures to determine suitable specifications. They

discuss the lethal effects of oils on larvae and incline to the view that the vapours act as toxic agents. Experiments carried out in New Jersey by GINSBURG established the following facts:—

"1. The toxicity of petroleum distillates is in direct proportion to rate of volatility and inversely proportional to the boiling point.

"2. From the standpoint of mosquito control, the petroleum distillate oils can be divided into two groups:

"Oils of low boiling points and high volatility, possessing high toxicity to larvae and pupae.

"Oils of high boiling points and low volatility, possessing little or no toxicity.

"3. Oils boiling from 200 to 550° F. kill larvae and pupae within 30 minutes by exerting a direct toxic effect.

"4. Oils of high boiling ranges, such as lubricating and similar oils, act simply by suffocation, the rate of kill being in proportion to the thickness of the film and degree of surface tension.

"5. Larvae, whose respiratory siphons are filled with non-toxic oil, do not develop into pupae.

"6. Pupae whose trumpets and part of the thorax are filled with non-toxic oil can, under certain conditions, develop into adult mosquitoes.

"7. The breathing tubes of larvae and the trumpets of pupae can readily penetrate the thin films of oil that are usually applied on mosquito breeding places.

"8. For highly efficient mosquito control in the field the oil must not only form a uniform film but must also be directly toxic to larvae and pupae."

The toxicity and penetration of a number of petroleum oil distillates varying in boiling point from 200 to 700° F. were tested. The use of Sudan III enabled the red stained oil to be traced wherever it penetrated the tracheae of larvae and pupae. It follows from the experiments that the use of oils should be restricted to those having a low boiling point and high volatility "making up in quick kill for limited lasting qualities."

"If the question of more rigid economy is involved, a mixture of a sufficient amount of highly volatile oil having a boiling point range of say 300 to 500° F. and a high boiling point product such as the cheap waste crank case oil—the final mixture registering a Baumé gravity of 32 to 34°—will give good results as far as spreading and good stable film are concerned. If waste oil is used it is most important that it be very thoroughly strained. For that purpose a series of at least two screens, with the last one not larger than 40 meshes to the inch, is recommended."

The Committee add: There is need for a larvicide which will thoroughly mix in solution with any water in which mosquitoes breed, and effect a rapid kill. It should be effective in at least 1 part in 10,000.

A. G. B.

PETERSON (J. P.) & GINSBURG (J. M.). **Two Years' Study and Practical Use of Crankcase Waste Oil as a Mosquito Larvicide.**—*Proc. 16th Ann. Mtg. New Jersey Mosquito Exterm. Ass., Atlantic City, New Brunswick, N.J.* 1929. pp. 92–101. With 2 plates. [6 refs.] [Summarized in *Rev. Applied Entom.* 1929. Dec. Vol. 17. Ser. B. Pt. 12. p. 245.]

"An account is given of experiments and field observations showing that crank case oil can be efficiently used against mosquito larvae. The oil almost always requires straining, and apparatus for doing this is described.

It does not in itself spread on water, but may be made to do so by the addition of a spreader such as tar acid (containing 25 per cent. cresylic acid) or by adjusting the specific gravity of the oil to 32 or 34° Bé. by the addition of light petroleum distillates. Of these, one of the most satisfactory was found to be a waste product obtained from "varnolene", which is used as a solvent in the varnish industry, etc. It is a low boiling petroleum distillate and possesses the following specifications: Bé. gravity 46·8°; flash point 96° F., closed cup; 160° F., open cup; boiling range, 300–417° F. Like tar acid, it is itself highly toxic to mosquito larvae, whereas crank case oil is not. The lasting quality of the oil mixture is from 2 to 4 weeks, or twice as long as that of fuel oil, and the cost is about half that of the latter.

"A method of calculating the amounts of the two oils to be mixed that are required to obtain a mixture of a given specific gravity is described."

J. F. C. H.

MANSSELL (R. A.). Note on Experiments towards the Production of a Cheap Insecticide for Anti-Mosquito Work.—*Jl. Roy. Army Med. Corps.* 1930. Feb. Vol. 44. No. 2. pp. 123–127.

Seeking a cheap, safe and effective solution for use as an insecticide spray the author has arrived at the following formula:—

Medicinally pure CCl_4 , 1 per cent. and synthetic wintergreen oil (methyl salicylate), 2 per cent., in second quality kerosene, to which mixture $\frac{1}{2}$ lb. ordinary naphthalene balls is added for each gallon. It is stated that in Peshawar this costs about Rs.2·8 per gallon. The commercial "Flit" seems to have been about as effective. [BRUG & VAN SLOOTEN (this *Bulletin*, Vol. 25, p. 278), made a mixture "Rids" of kerosene 89·6, CCl_4 7, methyl salicylate 3·4 and found it effective, but no loss of efficiency followed omission of the methyl salicylate and a cheaper mixture was used of 2 parts of CCl_4 to 100 parts of kerosene.]

J. F. C. H.

GIOSEFFI (M.). La lotta antianofelica in Istria. [Anti-Mosquito Measures in Istria.]—*Malariologia.* 1930. Feb. 5. pp. 103–104. Also in *Policlinico.* Sez. Prat. 1930. May 5. Vol. 37. No. 18. pp. 661–662.

The measures adopted have been along the usual lines, filling in and draining of swamps, removing undergrowth, the use of larvicidal fish in some ponds, spraying others with Paris green and general bonification. The results have been most satisfactory. Of 7,211 specimens of blood examined in 1917, 26·3 per cent. showed malarial parasites. In the last 4 years the figure has steadily fallen from 26·6, to 16·3, 3·9 and, in 1928, to 1·1 per cent. Benign tertian is by far the most common, the ratio being nearly 30 to 1 of the subtertian and quartan.

H. H. S.

DOLLOFF (A. F.). The Use of Stearates (Calcium and Aluminum) as Diluents for Paris Green in Anopheles Control. A Preliminary Report.—*Public Health Rep.* 1929. Oct. 25. Vol. 44. No. 43. pp. 2588–2594.

The use of Paris green as a larvicide for anopheline mosquitoes, with hydrated lime as a diluting agent, has become standard practice in the U.S.A.

Seeking some diluent which is highly insoluble and lighter than the lime, and which would therefore keep the green afloat for a longer time, the author here reports on the stearates of calcium and aluminium. His experiments show that these substitutes prolong the time before reappearance of larvae from about 3 days to about 5 or 6.

J. F. C. H.

LOUGHNAN (W. F. M.). **Bourgault's Cattle-Fly Trap.**—*Jl. Roy. Army Med. Corps.* 1930. Mar. Vol. 54. No. 3. pp. 208-211. With 3 text figs.

Loughnan gives an account of an ingenious but simple way of ridding cattle of any flies that adhere to them and of capturing the detached flies.

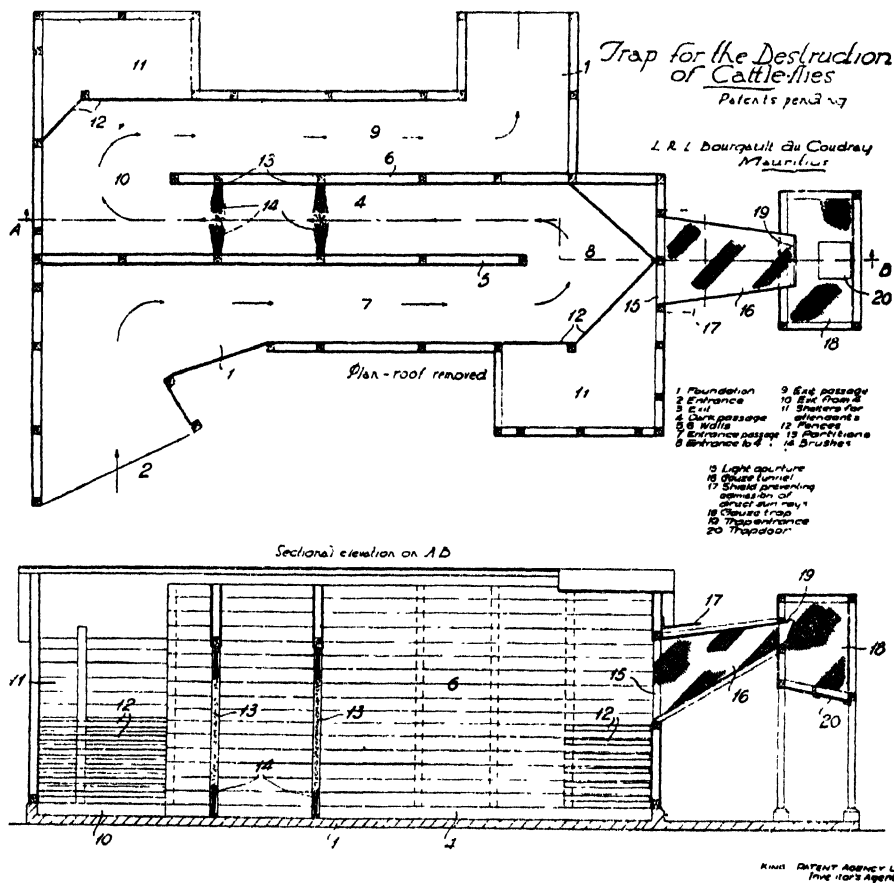


Fig. 1. Plan and sectional elevation of Bourgault's Cattle Fly Trap. The cattle enter at 2 and passing along 7 enter a second passage 4, from whence they pass through the partitions 13 made of branches and coco leaves (see fig. 2). These partitions brush off the flies which then make for the nearest source of light at point 8 where they enter a fly trap and are destroyed.

[Reproduced from the *Journal of the Royal Army Medical Corps.*]

"The trap consists of a darkened building through which the cattle walk and brush off or disturb any flies which may be on them, and the natural tendency of these insects to seek the light is utilized to attract them into a destructor trap."

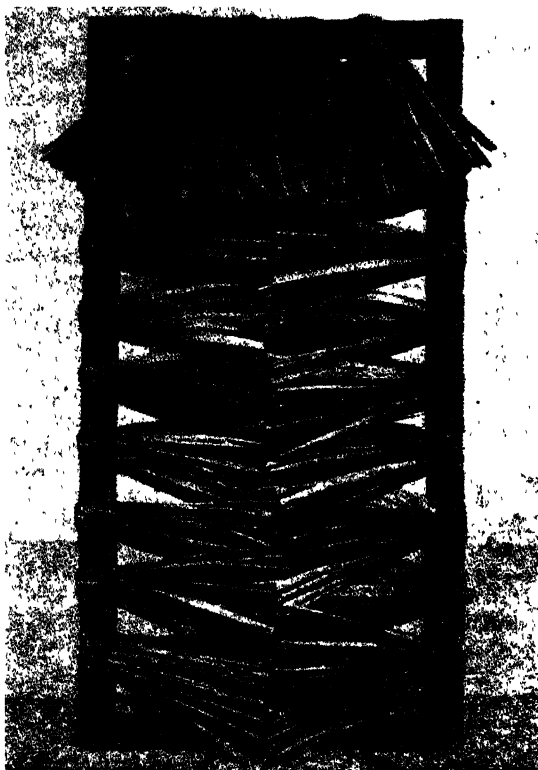


Fig. 2. Photograph of partition 13 (see plan) made of coco leaves through which the cattle have to pass.

[Reproduced from the *Journal of the Royal Army Medical Corps.*]

The illustrations reproduced should enable the trap to be copied: it has, however, been patented in Britain and some other countries.

J. F. C. H.

KELLAWAY (C. H.). **The Specificity of Active Immunity against Snake Venoms.**—*Jl. Path. & Bact.* 1930. Jan. Vol. 33. No. 1. pp. 157-173. With 1 text fig. [17 refs.] [Walter & Eliza Hall Inst., Melbourne.]

[Notwithstanding the generally acknowledged specific limitations of snake antivenenes, there has accumulated of late a fair amount of experimental evidence that some "specific" antivenenes do neutralize or mollify the effects of the venoms of other species of snakes.] The present paper records an immense volume of accurate experiment on another side of this subject, namely, on the capacity of an animal immunized to the venom of one particular species of snakes to resist the venom of other species. Throughout the experiments well-grown guineapigs were used (600 to 800 gm.) in very large numbers; these animals being chosen as susceptible to venom, although sensitive to anaphylaxis.

They were immunized in large batches, severally to venom of Australian Tiger Snake (*Notechis scutatus*), Death Adder (*Acanthophis antarcticus*), Copperhead (*Denisonia superba*), and Black Snake (*Pseudechis porphyriacus*), and Indian Cobra and Russell's Viper, and the capacity of individuals of each batch immunized to venom of the one particular species to resist venoms of other species was tested. The results of the experiments—a mass of interesting detail, qualified, quantified, and tabulated—are not amenable to brief summary statement, but they reveal the occurrence of a fair amount of non-specific (or ultra-specific) active immunity. The following is a bald outline of the evidence.

Of the guineapigs immunized to the venom of the Tiger Snake 15 were tested with lethal subcutaneous doses of Copperhead venom, and 14 showed no symptoms; 14 with Death Adder venom, and 4 survived; 4 with Cobra venom, and all died; 3 with venom of the Australian Giant Brown Snake (*Oxyuranus macleyneni*), and showed no symptoms; 2 with venom of the Australian Brown Snake (*Diemisia textilis*), and 1 showed no symptoms; 3 with venom of the Black Snake, and all died.

Of the guineapigs immunized to Copperhead venom 6 were tested with lethal subcutaneous doses of Cobra venom, and all died; 8 with Death Adder venom, and 2 survived; 16 with Tiger Snake venom, and 10 survived; 3 with *O. macleyneni* venom, and all died; 2 with Brown Snake venom, and 1 survived; 2 with Black Snake venom, and both died.

Of the guineapigs immunized to Death Adder venom 5 were tested with lethal injections of Copperhead venom, and 4 showed no symptoms; 3 with Tiger Snake venom, and 2 showed no symptoms. The other 2 of the series died on the 13th and the 7th day respectively.

Of the guineapigs immunized to Cobra venom 5 were tested with lethal subcutaneous doses of Copperhead venom, and 2 survived; 6 with Death Adder venom, and 1 survived; 4 with Tiger Snake venom, and 3 showed no symptoms. The nine deaths in this series occurred in from about 20 hours to the 3rd day.

Of the guineapigs immunized to Russell's Viper venom 9 were tested with subcutaneous lethal doses of Copperhead venom, and 2 survived; 7 with Death Adder venom, and 1 survived; 10 with Tiger Snake venom, and 3 survived; and 4 with Cobra venom, and all died in 8 to 24 hours. In the fatal cases of this series the deaths usually were much later.

Further experiments were undertaken to ascertain whether any protective effect against the thrombase of a coagulant venom was exercised by immunization to alien (non-specific) venoms. The result showed that such protection was afforded to Elapine snakes by immunization to certain feebly coagulant venoms of other Elapine snakes, but not by the powerfully coagulant venom of the more distantly related Russell's viper.

The author's main general conclusions are that in active immunity to snake venoms "specificity" seems to be somewhat less strict than in passive protection with specific (univalent) sera; and that active protection against the venom of one species of snake may also give some protection against the venoms of other closely related species—the zoological affinity being more important than a close resemblance in the behaviour of the venoms.

A. A.

VELLARD (J.). Spécificité des sérums anti-ophidiqes. [**Specificism of Antiophidic Serums.**]—*Ann. Inst. Pasteur.* 1930. Feb. Vol. 44. No. 2. pp. 148–170. [23 refs.]

[A good deal has been said from time to time, ever since the early days of CALMETTE'S Cobra antivenene, about what may be called the

"extraspecific" property of certain antivenomous serums—i.e., their power of neutralizing venoms of snakes other than the species from whose venom they were prepared.] The present paper reports some interesting experimental work based on a brief critical review of this subject.

The snake venoms used in the present experiments were Viperids—*Crotalus terrificus*, *Lachesis jararaca*, *L. lanceolatus*, *L. flavoviridis*, and *Vipera aspis*. The antivenomous serums were anticrotalic, antithroptic, antijararaca, antivenomous serum of Tokio, and Serum E.R. of the Pasteur Institute of Paris. The subjects of experiment were pigeons, and the method was intravenous injection after an hour in contact *in vitro* of given quantities of venom and antivenom. To minimize error in judging specificity of venoms and antivenoms, the action of the different antivenoms upon a selected venom was compared, not the action of a given antivenom upon a series of venoms. The experiments are described.

The author's conclusions from them are: (1) that (for the material studied) all the antivenomous serums always showed a very high specificity for their respective venoms, and that this specificity was observed both *in vivo* and *in vitro*, and for the whole venom as for its components (neurotoxic, coagulant, proteolytic, etc.); (2) that all the antivenomous serums also possessed a feeble "paraspecific" power over the venoms of the other species studied, though this paraspecific power was not exercised equally on the different components of a "heterologous" venom and was not in any direct relation to zoological affinities, but was observed only with venoms having pharmacological resemblances.

A. A.

VELLARD (J.). Vaccination antivenimeuse. [**Antivenom Vaccination.**] —*C.R. Acad. Sci.* 1930. Mar. 31. Vol. 190. No. 13. pp. 826-828.

Experimenting with certain lipoids (egg-lecithin, cholesterin, and cerebral lipoids extracted by alcohol and ether) the author finds that they modify or destroy the virulence of certain snake and arachnid venoms without affecting the immunizing properties of the respective venoms, and thus can be used in the preparation of specific vaccines.

The specific venom dissolved in weak (0.8 per cent.) NaCl solution is mixed with glycerine (3 gm. to 1 gm. of venom) and the mixture is evaporated to a jelly; the lipid is then added (5 gm. to 1 gm. of venom) and the mixture is incubated at 37° (? C.). In the course of time—several weeks or months of contact—the venom so manipulated gradually loses its virulence, but retains its specific immunizing value as a protective vaccine against the corresponding pure venom.

Hepatic lipoids, rich in lecithin, are as attenuants most potent against venoms of S. American crotalines (*Crotalus* and *Lachesis*), of *Vipera russellii*, and of sundry spiders and scorpions; numerous examples are given of the protection imparted to rabbit, guineapig, and dog by attenuated venoms of these crotalines. Egg-lecithin gave perceptible attenuant results against *Crotalus terrificus* venom only. Cholesterin and cerebral lipoids rich in cholesterin were attenuant only against cobra (*Naja tripudians*) venom.

These lipid vaccines are strictly specific. Their immunizing virtue keeps stable for several years, but is destroyed in 15 minutes by a temperature of 120°. Unlike primitive lipoids they are dissolved with difficulty in ether, and so can be sterilized in that liquid.

It is recorded that the venom of the toad *Bufo marinus* is not modified by any lipid.

A. A.

LAL (Nand). **On the Desiccation of Antivenomous Serum and the Value of the Dried Product as an Antidote against Snake Bite. Part I.—Indian Jl. Med. Res.** 1930. Jan. Vol. 17. No. 3. pp. 867–880. With 1 text fig. [11 refs.] [Central Research Inst., Kasauli.]

The method of drying the Kasauli antivenomous serum when taken fresh from the horse highly immunized to the mixed venoms of cobra and Russell's viper, and experiments comparing the potency of the dried with the liquid antivenom after various terms of storage are described. The antivenomous serum can be rapidly dried over sulphuric acid *in vacuo* without appreciable loss of potency, and the dried product gives a "practically clear" solution in distilled water constantly up to 2 years. No difference of potency was observed in the two products up to 1 year, but by that time the liquid product was unfit for intravenous injection since it contained a considerable deposit.

A. A.

BILLING (Wyly McG.). **The Action of the Toxin of *Crotalus adamanteus* on Blood Clotting.**—*Jl. Pharm. & Experim. Therap.* 1930. Feb. Vol. 38. No. 2. pp. 173–196. [23 refs.] [Med. College, Univ. of Cincinnati, Mount Auburn, Ohio.]

The M.L.D. of dried-venom of *Crotalus adamanteus* for white rats is determined as 0.025 gm. per kgm. (intraperitoneally); about 10 times the M.L.D. for a guineapig, and 6 times for a rabbit. The said venom shows neither a tissue-fibrinogen nor a thrombin clotting action on citrated horse-plasma, to which it is a powerful anticoagulant *in vitro*; it has a specific proteolytic action on blood-fibrinogen, converting it into a more soluble protein (coagulable at 82° C.) and an albumose; and it has little or no proteolytic action on serum-albumin or on fibrin. It contains a protease which appears to be specific for fibrinogen alone. It has a lipolytic action on cephalin, liberating a fatty acid and destroying its power to form thrombin. It destroys, to some extent, the power of tissue-fibrinogen to cause intravascular clotting, when both are injected in a mixture; but if a small (non-toxic) dose of the tissue-fibrinogen be injected simultaneously into the peritoneum (or half-an-hour beforehand) the M.L.D. for a white rat can be reduced from $\frac{1}{2}$ to $\frac{1}{4}$ —the cause of which is still being investigated.

A. A.

ESSEX (Hiram E.) & MARKOWITZ (J.). **The Physiologic Action of Rattlesnake Venom (Crotalin). I. Effect on Blood Pressure: Symptoms and Post-Mortem Observations. II. The Effect of Crotalin on Surviving Organs. III. The Influence of Crotalin on Blood, in Vitro and in Vivo. IV. The Effect on Lower Forms of Life. V. Some Experiments on Immunity to Crotalin.**—*Amer. Jl. Physiol.* 1930. Mar. 1. Vol. 92. No. 2. pp. 317–328. With 8 text figs. [12 refs.]; 329–334. With 4 text figs. [3 refs.]; 335–341. With 4 text figs. [5 refs.]; 342–344. [4 refs.]; 345–348. With 5 text figs. [Division of Experim. Surgery & Path., Mayo Foundation, Rochester, Minn.]

— & —. **The Physiologic Action of Rattlesnake Venom (Crotalin). VI. The Effect of Crotalin on a Visceral Organism. VII. The Similarity of Crotalin Shock and Anaphylactic Shock. VIII. A Comparison of the Physiologic Action of Crotalin and Histamine.**—*Ibid.* Apr. 1. No. 3. pp. 695–697. With 1 text fig. [1 ref.]; pp. 698–704. With 4 text figs. [7 refs.]; pp. 705–706. [4 refs.] [Mayo Foundation, Rochester, Minn.]

This is a study of crotalin (rattlesnake venom), a subject which was the theme of the classical researches of the great American physiologist WEIR MITCHELL. This, however, is an abstruse study of the ultimate effects of

the venom upon animals and animal tissues, as pursued and measured by technical laboratory methods, and its purport and scope are sufficiently summarized and illustrated in the title.

A. A.

KELLAWAY (C. H.), FREEMAN (Mavis) & WILLIAMS (F. Eleanor). **The Fractionation of Australian Snake Venoms. I. The Venom of the Death Adder (*Acanthophis antarcticus*).**—*Australian Jl. Experim. Biol. & Med. Sci.* 1929. Dec. 16. Vol. 6. Pt. 4. pp. 245–260. With 2 text figs. [17 refs.] [Walter & Eliza Hall Inst., Melbourne.]

An effective method of quantitative fracture of Death-Adder venom, by extraction with 45 per cent. ethyl alcohol, is described. The insoluble fraction retains all the feeble coagulant activity of the venom. The soluble fraction contains the neurotoxic principle. The haemolytic activity appears to be evenly shared. The stimulant action on plain muscle is present more in the soluble than in the insoluble fraction. Titration by subcutaneous injection indicates that almost all the thus recognizable toxic activity is present in the soluble fraction; but intravenous injection (mice and guineapigs) indicates a fairly even distribution between the two fractions. These are taken from the authors' conclusions.

A. A.

PHISALIX. L'immunité naturelle antivenimeuse et antirabique du Lérôt commun (*Eliomys nitela* Schreb). [**Natural Immunity of the Common Dormouse to Viper Venom and Rabies Virus.**]—*C. R. Acad. Sci.* 1930. Jan. 13. Vol. 190. No. 2. pp. 138–140.

Madame Phisalix after reminding us that examples of natural resistance to venoms and to the virus of rabies are very rare among birds and mammals (although they are frequent among cold-blooded vertebrates) now introduces the common dormouse into the small company of resistant mammals. Her experiments, here fully described, show that for a dormouse of 50 gm. the minimum lethal dose (subcutaneous) of viper venom is 10 mgm.—enough to kill 25 guineapigs, or (intracerebral) 5 vipers. In encounters between the two animals it is always the little dormouse that is the assailant and the mangled viper that supplies the larder.

The natural immunity of the dormouse to rabic virus is also determined by experiments here described. In October a month before retiring for their winter sleep, 6 dormice received by intramuscular injection, 0.5 cmm. of a thick emulsion of the fixed virus and 2 controls a thick emulsion of normal rabbit's brain. One control and one of the inoculated developed a general cutaneous mycosis, which was quickly mortal. After emerging from their winter sleep of five months none of the others exhibited the least symptom of rabies, and when they were killed 3 months afterwards their brains were found to be non-infective to the brain of rabbits. Further experiment *in vitro* demonstrated the rabicide power of the serum of the dormouse; the equal mixture of serum and fixed virus, however, though non-infective to the rabbit (in 0.25 cmm. submeningeal doses of a preparation equivalent to a 10 per cent. emulsion of fixed virus) did not confer any immunity on the animal.

A. A.

OTTO (R.). Weitere Beiträge zur Serumtherapie bei Bissen europäischer Ottern. [**Further Contributions to the Serumtherapy of Bites of European Vipers.**]—*Arch. f. Hyg. u. Bakt.* 1930. Jan.–Feb.–Mar. Vol. 103. No. 1–3. pp. 165–172. [Robert Koch Inst., Berlin.]

KRAUS (this *Bulletin*, Vol. 24, p. 404 and Vol. 26, p. 778) and MORITSCH (*Id.*, Vol. 24, p. c.) have shown that the venom of the common

European viper (*V. aspis*) is neutralized by the antiothrops (anti-Lachesis) serum produced at the Butantan Institute from S. American viperid venoms. Following them Otto (*Id.*, Vol. 26, pp. 778, 779) has shown that both the antiothrops and the antophidic serums of Butantan have this same protective power against *V. aspis*; but that against the venoms of other European species of *Vipera* the efficacy of the said Butantan anti-venoms varies in degree. Otto's present experiments give exactitude to the latter statement, in a comparison of the reactions of the venoms of six European species of vipers (including *V. aspis*) with the two Butantan antivenoms and the *V. aspis*-antivenom of the Paris Institute. The original tables must be studied and compared. The European *V. aspis*-antivenom takes 3 full points (*V. aspis*, *V. berus*, and *V. triglav*) 2 "decided" points, and 1 complete failure (against *V. mesocoronis*); the Butantan antophidic antivenom takes 2 full points (*V. aspis* and *V. triglav*) and 4 "decided" points; and the Butantan antiothrops antivenom takes 2 full points (*V. igman* and Hungarian viper), 1 "decided" point (*V. mesocoronis*), 1 "substantial" point (*V. aspis*), and 2 "weak" points (*V. berus* and *triglav*).

A. A.

RENAUD (Maurice). Immunisation contre le venin de cobra par les complexes venins-savons. [**Immunization to Cobra Venom by Venom-Soap-Compounds.**—*C.R. Soc. Biol.* 1930. Jan. 24. Vol. 103. No. 3. pp. 143-144. [1 ref.]

In an earlier paper (see this *Bulletin*, Vol. 26, p. 274) the author showed that cobra-venom can be detoxified by contact (continued for 4 to 6 days) with colloidal solutions of various soaps. In the present paper he shows that the innocuous soap-venin compounds retain their "immunogenous" properties.

A. A.

ARTHUS (André). Le venin de cobra rendu inoffensif par l'action des rayons ultra-violets a perdu son pouvoir immunisant. [**Loss of Immunizing-Power by Cobra-Venom Detoxified by the Action of Ultra-violet Rays.**—*C.R. Soc. Biol.* 1930. Jan. 24. Vol. 103. No. 3. pp. 130-132. [3 refs.] [*Physiol. Inst., Univ., Lausanne.*]

It has been shown that the virulence of cobra venom is destroyed by ultra-violet radiation, and later by Jean FAVRE that the immunizing power also disappears. In the present paper the latter fact is amply corroborated.

A. A.

EIDINOW (Albert). **The Effect of Irradiation on Cobra Venom and Antivenin.**—*Brit. Jl. Experim. Path.* 1930. Apr. Vol. 11. No. 2. pp. 65-72. [1 ref.] [*National Inst. for Med. Research, Hampstead, London.*]

The technical and experimental detail cannot be condensed. The following is the author's own summary of results:—

"As a result of irradiation of cobra venom and antivenin it has been shown that (1) the neurotoxin present in a solution of cobra venom in saline was destroyed only by rays shorter than 2800 Å.v. unless sensitized with eosin. (2) The photodynamic action of eosin is arrested by the presence

of blood and serum. (3) Haemolysins and cytolysins were destroyed by rays longer than 2800 Å.u., but not by rays longer than 3300 Å.u. (4) Antivenin is resistant to prolonged irradiation as obtained in serum." The source of light employed was two quartz mercury-vapour lamps.

A. A.

ESTIVAL (G). Un cas de morsure par *Cerastes vipera* L. [**A Case of *Cerastes vipera* Bite.**].—*Arch. Inst. Pasteur d'Algérie*. 1929. June. Vol. 7. No. 2. pp. 220–221. [Pasteur Inst. of Algeria, Algiers.]

The patient, a native of N. Africa, was bitten at nightfall just above the right ankle. The bite was immediately scarified and treated with KMnO_4 , and an injection of two ampoules of the antiviperine serum of the Pasteur Institute of Algeria was given. Next morning the whole leg was swollen and excruciatingly painful. Fomentation was kept up, and the pain and swelling subsided in the course of 12 days, during some of which the patient suffered from fever and violent headache. The snake was identified at the local Pasteur Institute.

A. A.

KELLAWAY (C. H.). **The Venom of *Latrodectus hasseltii*.**—*Med. Jl. Australia*. 1930. Jan. 11. 17th Year. Vol. 1. No. 2. pp. 41–46. With 1 text fig. [10 refs.] [Walter & Eliza Hall Inst., Melbourne.]

An experimental study of the venom of the spider *Latrodectus hasseltii*, the experiments showing the effects of various doses, both subcutaneous and intravenous, on guineapigs. Like other species of the genus, *L. hasseltii* is venomous, and the author's main conclusions are that the symptoms in animals naturally bitten suggest that the venom has a neurotoxic action; that bronchial constriction plays a dominant part in death, in guineapigs, from the bite; that there is no evidence of the venom having any effect on the coagulation of the blood; and that extracts of the spiders' bodies are powerfully haemolytic. The rabbit is said to be moderately resistant to the venom. [Previous references to venomous spiders of the genus *Latrodectes* are to be found in this *Bulletin*, Vol. 19, pp. 497, 846; Vol. 20, p. 801; Vol. 21, p. 169; Vol. 23, p. 875; Vol. 24, pp. 401, 402, 895–897; and Vol. 26, pp. 278, 779.]

A. A.

BEAZLEY (R. N.). **Death from the Bite of a Trapdoor Spider.**—*Med. Jl. Australia*. 1930. Feb. 22. 17th Year. Vol. 1. No. 8. pp. 255–256.

The victim, a stout woman of 46 years, was seen about 40 minutes after being bitten in the thumb. She was collapsed, pulse thready and almost uncountable, retching incessant, then dyspnoea and paroxysms of laryngeal spasm, cyanosis and general lividity. There was no local swelling nor any complaint of local pain. Apart from the laryngeal and pulmonary distress there were no spasms or tremor. The patient was treated with hot bottles and blankets, pituitrin, adrenalin, camphor, and atropin. On admission to hospital (about 4 hours after being bitten) the victim was restless and cyanosed, her breathing was stertorous, she was conscious, but reluctant to speak. Clonic contractions of arms and legs occurred every ten to twenty minutes, with laryngeal stridor and increase of cyanosis. The knee-jerks were increased; the pupils were small and did not react; the corneal reflex was sluggish. The pulse was

almost imperceptible. About 6 hours after being bitten the patient became comatose, but still had laryngeal spasms, and 3 hours subsequently she suddenly died.

Two minute punctures indicated the bite, and two thrombosed small vessels were noticed in the excised skin. The treatment in hospital was local application of permanganate after excision of the bitten area, and administration of stimulants.

At the post-mortem examination the blood was very dark and clots were found in the right chambers; the lungs were oedematous and congested; congested patches were present in the mucosa of the cardiac end of the stomach; the liver was congested in places, also the kidneys and the brain.

The spider was identified as *Atrax robustus*.

A. A.

BUDDLE (R.). Some Common Poisonous Fishes found in Singapore Waters.—*Jl. Roy. Nav. Med. Serv.* 1930. Apr. Vol. 16. No. 2. pp. 102-111. With 8 text figs. [5 refs.]

The information here collected about some of the more notorious poisonous and venomous fishes of the Indo-Pacific coasts will be a useful introduction to an interesting subject. Of fishes poisonous to the eater the author concentrates almost exclusively on the Plectognathi—fishes of bizarre form with rough leathery spine-like scales or with a rigid covering of bony plates, and commonly with incisor-like teeth forming a beak. He mentions Balistes (file-fishes or trigger-fishes), Monacanthus, Ostracion (box-fish or trunk-fish), Diodon (porcupine fishes), Triodon, Tetradon (globe-fishes), the last-named being known as *ikan buntal* by Malays. Two recorded cases of rapid poisoning from eating *Tetradon stellatus* are mentioned—the first symptoms being giddiness and vomiting, soon followed by fatal convulsions. Some of the Plectognathi can also do damage with their spinous fin-rays and with their beak-like teeth. Apart from the Plectognathi the author mentions only *Scatophagus argus*, “a fish of doubtful edibility, though frequently seen in the markets.” Of fishes that inflict envenomed wounds with the spines of their fins the author mentions only the well-known Siluroid *Plotosus caninus* (*Ikan sembilang*), the Scorpaenoids *Pelor didactylum* (*lepou*), *Synanceia horrida*, and Scorpaena, and the notorious sting-rays known in the vernacular as *Ikan pari*.

A. A.

GUDGER (E. W.). Poisonous Fishes and Fish Poisonings, with Special Reference to Ciguatera in the West Indies.—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 43-55. [6 refs.]

This is an interesting introduction to the subject. The author refers the serious investigator to the great treatise *Animaux Venimeux et Venins*, by Madame PHISALIX [reviewed in this *Bulletin*, Vol. 19, pp. 622-625]. The author emphasizes very fully the fact that poisoning as a result of eating fish is of two kinds: one is little more than an acute gastro-enteritis caused by fish that in some obscure way acts as an irritant; the other is a toxæmia, more enduring and having sequelae not connected with the gastro-intestinal tract, due to a definite toxin secreted by some tissue or viscus of the fish itself—such as the Tetradon toxin obtained from the ovary of Globe-fishes in Japan (see this *Bulletin*, Vol. 25, pp. 735 and 736).

A. A.

HOFFMANN (W. H.). La ciguatera, enfermedad producida por peces venenosos de Cuba. [*Ciguatera, a Form of Fish-Poisoning in Cuba.*]—Reprinted from *Investigación y Progreso*. Madrid. 1929. Nov. 1. Vol. 3. No. 11. pp. 101-102.

The author gives lists of 27 species of fish the sale of which is absolutely prohibited, of 4 more which are not vendible when adult, and of 14 others which are poisonous according to popular belief, some with a certain amount of scientific support. With so large a number, Cuba would be an excellent place for detailed study of this question.

H. H. S.

AYER (E. W.) & NEIL (J. M.). Protozoa in the Urinary Tract.—*Jl. Amer. Med. Assoc.* 1930. May 10. Vol. 94. No. 19. pp. 1489-1490.

BAUVALLET (H.), BRUCHAN (N.) & AGUESSY (C.). Index épidémique palustre à Porto-Novo (Dahomey).—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 106-109.

CARNEIRO (Homero). Campanha anti-larvaria no impaludismo. Notas e considerações.—*Rev. Med. Cirurg. do Brasil.* 1930. Mar. Vol. 38. No. 3. pp. 109-112.

COOPER (G. W.). Myiasis—Case Report.—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 112-114.

CORRADETTI (Augusto). Sulle modificazioni delle larve di anopheles in relazione col colore dell'ambiente.—*Riv. di Malariologia.* 1930. Jan.-Feb. Vol. 9. No. 1. pp. 35-39. [5 refs.] [English summary (8 lines) p. 95.]

FERRARI (Antonino). Considerações sobre a ophtalmomyases determinada pela "Dermatobia cyaniventris" Macquart—1840.—*Brasil-Médico.* 1929. Nov. 23. Vol. 43. No. 47. p. 1428.

GASPERINI (Carlo Gasperino). A proposito dei culicidi e della lotta contro di essi nell'isola di Rodi.—*Arch. Ital. Sci. Med. Colon.* 1930. Feb. 1. Vol. 11. No. 2. pp. 104-109. English summary (3 lines).

HAGA (J.). Tabellen voor determinatie der in Nederlandsch-Oost-Indië voorkomende Anophelinen.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. Apr. 1. Vol. 70. No. 4. pp. 363-382.

HECHT (Otto). Die Hautreaktionen auf Insektenstiche als allergische Erscheinungen. (Kurzer Bericht ueber den Vortrag als vorläufige Mitteilung).—*Beihfte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 028-281 (364-365).

IYENGAR (M. O. T.). The Larva of *Anopheles turkhudi*.—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1189-1194. With 1 text fig. & 12 figs. on 1 plate. [4 refs.]

JÍROVEC (Otto). Studien ueber blepharoplastlose Trypanosomen.—*Arch. f. Protistenk.* 1929. Vol. 68. No. 1. pp. 187-208. With 34 coloured figs. on 2 plates. [34 refs.] [Zoolog. Inst., Karls Univ., Prague.]

KNOWLES (R.). The Evolution of Medical Protozoology.—*Indian Med. Gaz.* 1930. Jan. Vol. 65. No. 1. pp. 23-30. [38 refs.]

LATHBURY (E. B.). An Apparatus for breeding out the Larvae of Mosquitoes.—*Jl. Roy. Army Med. Corps.* 1930. Feb. Vol. 44. No. 2. p. 130. With 1 text fig.

LIMA (A. da Costa). Sobre alguns anophelineos encontrados no Brasil (2a nota).—*Inst. Oswaldo Cruz, Suplemento das Memorias.* 1929. Dec. 31. No. 12. pp. 275-293. With 41 figs. on 18 plates. [33 refs.]

LÓPEZ (Julio A.). La infección palúdica crónica y su relación con las neumonías en las zonas palúdicas del noroeste argentino.—*Semana Méd.* 1930. May 1. Vol. 37. No. 18 (1894). pp. 1136-1141. With 1 text fig.

MUKERJI (S.). On an Improved Method of dissecting Sand Flies for Parasitological Observations.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 755-757. [2 refs.]

- PERVASSU (Antonio). O emprego de peixes na destruição das larvas de mosquitos.—*Folha Med.* 1930. May 15. Vol. 11. No. 14. p. 160-162. With 2 text figs.
- POGGI (Igino). Sulla distribuzione di culicidae in alcune isole dell'Egeo.—*Arch. Ital. Sci. Med. Colon.* 1930. Feb. 1. Vol. 11. No. 2. pp. 110-111. English summary (4 lines). [Inst. of Trop. Path., Univ., Bologna.]
- PORTER (Annie) & HEYMANN (S. C.). On the Occurrence of *Cordylobia Anthrophaga* in an Infant in South Africa.—*Jl. Med. Assoc. South Africa.* 1930. Feb. 8. Vol. 4. No. 3. pp. 73-75. [2 refs.]
- PURI (I. M.). A Note on Two Species of Indian Anopheline Mosquitoes—*A. insulae florum* Swellengrebel and *A. aithenii* James, with its Variety *Bengalensis* nov. var.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 953-956. [6 refs.] [Central Research Inst., Kasauli.]
- SIMIC (T.). Etude comparative de la biologie de *Phlebotomus perniciosus* et *Phlebotomus papatasi* en Macédonie.—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 179-182. [1 ref.] [Hyg. Inst., Skoplje, Yugoslavia.]
- SOESILO (R.). Aanvulling op het artikel van De Rook en Soesilo over *Anopheles papuae*.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. July 1. Vol. 70. No. 7. pp. 695-696. With 1 fig.
- TAYLOR (Mark R.). Notes on Adder Bite.—*Brit. Med. Jl.* 1930. Mar. 1. pp. 387-388.

LABORATORY REPORTS.

- i. NIGERIA. **Annual Report of the Medical Research Institute, 1928** [CONNAL (Andrew), Director].—*Ann. Med. & San. Rep. Nigeria, 1928*. Appendix A. pp. 1-45. With 29 figs. on 5 plates & 1 chart.

i. The outstanding features of this report are, apart from the good printing and the fine and select illustrations, the exact and significant records of rats as focal reserves of plague and the full and precise observations of the local mosquitoes. Other salient points are dermatology, the careful record of 18 cases of blackwater fever, and the list of 45 identified Nigerian snakes, of which 12 are venomous species.

In this, the fifth year of plague in Lagos, 75,639 rats were examined, including 70,067 *Rattus rattus* ("black" rats), 2,418 *Rattus norvegicus* (brown rats), 2,153 *Dasymys rufulus* (swamp rats), and 1 *Cricetomys gambianus* (pouched rat). Moreover, 8,310 mice (*Mus musculus*) and 3,022 shrews (*Crocidura manni*) were examined also. For the first three months of the year the percentage of pregnant rats caught was 5.0; for the other nine months it ranged between 2.9 (April) and 3.9 (June).

Signs of plague were observed *only* in the black and brown rats, the number of infected individuals being 1,214, or one in 60. The month showing the highest percentage of rat infection was, as in past years, October; that showing the lowest percentage was April. (Diagnosis, of course, rested on demonstration of *Pasteurella pestis*). The post-mortem signs of plague, as observed in the 1,214 infected rats, are described in considerable detail. The fleas taken from the rats were, with the exception of 7 dog-fleas and 1 *P. irritans*, all *Xenopsylla*—from dead rats 4,235 *X. cheopis*, and 2,034 *X. brasiliensis*, and from live rats 2,074 *X. cheopis* and 1,412 *X. brasiliensis*. Among other ectoparasites, especially in brown rats, was the maggot of the tumbu fly (*Cordylobia anthropophaga*).

Records of 18 cases of blackwater fever were received during the year, one of them being in a female W. African infant, and a methodical summary of each case is reported. In epitome, there were 11 recoveries. There had been a previous attack in 4 cases and there was a history of malaria in all. Four patients suffered relapse, one having 2 and one 4 relapses before the urine cleared finally. Subtertian parasites were demonstrated, just before or during the first day of blackwater, in 8 cases.

The venomous local snakes include three species of *Naja*, *Dendraspis jamesonii* and eight species of viperines, namely, *Causus rhombeatus* and *C. lichtensteini*, *Bitis arietans* and *B. gabonica*, *Atractaspis irregularis*, *A. aterrima*, *A. corpulenta*, and *A. hildebrandtii*.

Malignant tumours to the number of 36 were identified, 21 being carcinomatous and 15 sarcomatous.

The skin affections that attract notice are crab-yaws, gangosa, creeping eruption due to a nematode, mycetoma in which the fungus isolated is probably *Actinomyces pelletieri*, a fungus isolated from scrapings of tinea flava, a case of molluscum contagiosum in a baby, typical cases of psoriasis rapidly cured by irradiation, a case of favus yielding *Achorion schonleini*, Bockhart's impetigo frequently encountered among out-patients, and several good examples of herpes,

including an ophthalmic case with well-marked iritis. All suspicious sores and ulcers were carefully examined for leishmania, but this parasite was not struck.

Crab-yaws is here taken to be a true manifestation of yaws. There is always a definite history of yaws. It is cured by N.A.B. treatment. No fungus can be discovered. Quite similar lesions were produced experimentally in monkeys by SCHÖBL in the Philippine Is. The disease is seen most frequently in native soldiers, police, and prison warders.

Of gangosa 20 cases were observed. Most frequently there is an initial history of a sore within the nose apathetically endured and then spreading and eroding the face. Spirochaetes could not be discovered in serum squeezed from the ulcerated parts. After careful review of the evidence, the author supports the opinion that the disease "is definitely connected with" yaws.

Six cases of canine rabies were reported. Five of them were fully investigated and from one of them successful inoculation of rabbits was made.

A particular bacteriological examination of the local water supply suggests the conclusion that there is something in the water that destroys or at least inhibits the coliform group as a whole and especially *Bact. coli*.

The entomology report is a model of full and exact detail of practical importance locally. In 2,114 collections of mosquito larvae obtained from 55 different (and severally specified) sources and receptacles during ten months, *Aedes argenteus* was present in 2,100, *Culex nebulosus* in 838, and *Anopheles gambiae (costalis)* in 127. A mosquito-survey of certain local swamps was started and the species caught in 40 collections were identified and are recorded. The abundant mosquito fauna of the "water-lettuce" or "water-cabbage" (*Pistia*) was investigated and registered, and there has been much other study of the larvae of the Nigerian mosquitoes with a view to future publication of matured results.

A. A.

- ii. NIGERIA. **Annual Report of the African Hospital Laboratory, Lagos, 1928** [RAMSAY (G. W. St. C.), Pathologist].—*Ann. Med. & San. Rep. Nigeria. 1928.* Appendix C. pp. 65-74.
- iii. ——. **Annual Report on the Pathological Laboratory, Kaduna, 1928.**—*Ibid.* Appendix D. pp. 75-80.
- iv. ——. **Annual Report of the African Hospital Laboratory, Calabar, 1928** [RAMSAY (G. W. St. C.), Pathologist].—*Ibid.* Appendix E. pp. 81-89. [1 ref.]

These three reports are of a pattern. They sift and summarize and discuss the record of a busy routine—routine examination of blood and stools for parasites, examinations of urine, sputa, and sera, and observations of the post-mortem room and laboratory.

ii. *Report of the African Hospital at Lagos.* Routine examination of bloods from 2,878 Africans and 745 Europeans disclosed the following parasites: Subtertian malaria in 635 Africans and 114 Europeans; crescents in 27 Africans and 11 Europeans; quartan in 52 Africans and 2 Europeans; sheathed microfilariae in 40 Africans and 1 European; unsheathed microfilariae in 18 Africans. Serological examinations (by Sachs-Georgi and Kahn tests) of 438 cases showed a positive result

for 55 per cent. of Africans and 27 per cent. of Europeans. Routine examinations (single smear, not concentrated) of 1,337 African and 397 European stools gave the following evidence: *Ascaris*, in 620 and 3 respectively; hookworm, in 367 and 6; *Trichuris*, in 67 and 3; *Taenia*, in 9 Africans; *Schistosoma mansoni*, in 6 Africans; *Strongyloides stercoralis*, in 19 Africans; *Ent. histolytica*, in 26 Africans and 13 Europeans, and *histolytica* cysts in 17 and 18 respectively; bacillary dysentery in 10 Africans and 3 Europeans. Eggs of *Schistosoma haematobium* were found in 16 of 496 native urines. Tubercle bacillus in 6.6 per cent. and plague bacillus in 1.19 per cent. of 588 African sputa. In commenting on morbid histology the author states that "cirrhosis is nearly universally present" in some degree in the liver of all West African natives. Two cases of cerebral malaria were observed in African infants (6 and 14 months), the cerebral capillaries lined or blocked with the parasites. In 265 autopsies, 15 cases of pulmonary tuberculosis and 11 cases of tuberculous peritonitis are recorded, also 6 cases of pneumonic plague, and 5 primary cancers of the liver. A remarkable fatality is reported, where the victim caught between the buffers of two railway wagons had the ileum completely divided.

iii. *Report of the Kaduna Pathological Laboratory.* Routine blood-examinations of 4,500 Africans for parasites gave the following figures: *P. vivax*, 0; *P. malariae*, 14 instances; *P. falciparum*, 755 (and crescents, 18); *Spirochaeta recurrentis*, 1; trypanosomes, 15; microfilariae, 8. In the serological examinations a very wide disagreement between the Sachs-Georgi and the Kahn tests is shown. In routine examinations of 1,756 African stools the following evidence is recorded: *Ent. histolytica* in 78 instances, and *histolytica* cysts in 40; hookworm, in 429; *Ascaris*, in 212; *Taenia saginata*, in 86; *T. dispar*, in 30; *Schistosoma mansoni*, in 42. In 1,320 African urines eggs of *Schistosoma haematobium* occurred in 10 cases. In 111 African sputa 10 per cent. showed the tubercle bacillus, and 6.3 per cent. bronchial spirochaetes. In 40 autopsies 6 cases of tuberculosis (3 plunumary) are recorded; and in 88 specimens of morbid tissue 2 cases of carcinoma of breast and 1 case of sarcoma.

iv. *Report of the African Hospital Laboratory, Calabar.* Routine blood-examination of 1,563 individuals for parasites showed subtertian malaria in 167 cases, quartan in 16, and benign tertian in 2; microfilariae of *perstans* in 384, of *loa* in 80, and of *bancrofti* in 7. Those of *perstans* were of two "varieties." Of 600 patients tested for the Sachs-Georgi reaction 65 per cent. were positive. Routine examination of stools of 1,583 individuals gave evidence of hookworm in 983 cases, *Ascaris* in 973, *Trichuris* in 403, *Strongyloides* in 102, *Taenia solium* in 4, and *E. histolytica* in 56; all stools were re-examined weekly until a negative result was obtained or the patient was discharged. Thirteen cases of urinary schistosomiasis were encountered in 165 urines. A case of retroperitoneal sarcoma and 2 cases of pulmonary tuberculosis were disclosed post-mortem. The effects of protein shock were tried on 9 lepers in the isolation hospital; in six cases no obvious improvement was observed, but in three cases deep chronic ulcers on the soles healed "in a few weeks"; no ill effect could be attributed to the treatment. The results of a visit to the Missionary Leper Colony at Itu, where 616 voluntarily segregated lepers were examined, are described. "As a whole the cases were of recent origin" the average duration prior to treatment being six years. More than 80 per cent. of the cases were

maculo-anaesthetic. In 32 per cent. scabies was observed, being particularly common in children, and it is suggested that this must be of some moment in promoting entrance of the bacilli. Routine nasal smears showed that whereas the nodular and mixed varieties of leprosy had a very high rate of infectivity, less than 10 per cent. of the maculo-anaesthetic cases were actively infectious. In routine Sachs-Georgi tests 42.7 per cent. of the lepers gave a positive reaction, and it is shown that this figure represents the combined syphilis and yaws rates.

A. A.

GOLD COAST. Annual Report of the Medical Research Institute, Accra, and its Branches [BUTLER (G. G.), Director].—*Gold Coast Rep. on Med. & San. Dept. for Year 1928-1929*. IX.—Scientific. pp. 54-66.

Routine at Accra shows the usual predominance of subtertian malaria and the low rate of microfilaria infection in 477 blood films, and of *Ascaris* and hookworm and 1.8 per cent. of *Taenia* ova in 864 faeces. Of 102 specimens of urine 39 showed eggs of *Schistosoma*. The tubercle bacillus was found in 29 of 156 sputa. Of 28 tumours examined microscopically 12 were carcinomatous and 7 sarcomatous. One case of death from snakebite is recorded. Of 79 stray dogs examined *Ancylostoma braziliense* was found in 53 and *D. caninum* in 26. Of anophelines found in the quarters attached to the Accra Institute *A. pharoensis* predominated from April to July and *A. funestus* in August and September; *A. costalis* and *A. mauritanus* were caught occasionally. *Aedes argenteus* was not observed. No plague infection was recorded in (dead) rats examined.

The Sekondi routine, which also shows the enormous preponderance of *P. falciparum*, records the presence of 2 per cent. of *P. vivax* in the total of malaria films. *Schistosoma haematobium* was found only twice in 240 urines. In 29 of 224 sputa the tubercle bacillus was found. Faeces examinations show less than half the infestation with *E. histolytica* recorded at Accra. Of 14 tumours examined 8 were malignant. No plague was found in 2,978 rats examined.

Appendices, dealing respectively with Trypanosomiasis, Malaria in Parturients, and Hookworm experiments, are not included here.

A. A.

TANGANYIKA TERRITORY. Annual Report of the Medical Laboratory Dar es Salaam for the Year ending 31st December, 1928 [CLEARKIN (P. A.), Deputy Director of Laboratory Services].—60 pp. With 3 folding charts, 1 folding plan, 4 figs. on 2 plates & 1 map. 1930. Crown Agents for the Colonies, 4 Millbank, London, S.W.1. [2s. 6d.]

In this methodical report routine examinations of every kind, vaccine-lymph business, special investigations arising mainly out of the routine, and entomology, are each separately considered. In a special series of 169 blood-films all taken about 10 p.m. and from patients not having any appearances of filariasis 55 showed microfilariae of *F. bancrofti* and 1 of *F. perstans*. In two cases of otitis externa (said to be common in Dar es Salaam) the only organism revealed by culture was *Ps. pyocyanea*. In 86 serums the Wassermann and the Kahn reactions were compared

and "the value attributed by Kahn to his test as a check on treatment was borne out in our experience." From the Vaccine-lymph Institute at Mpwapwa (3,000 ft. elevation) 388,000 doses were distributed. Investigations of the development and persistence of activity in pulp as yielded from the eruption on the abdomen of the calf showed that activity was greatest in the pulp collected immediately after vesiculation (4th day) and was slightly less active (though greater in amount) on the 5th day, and considerably less active on the 6th and 7th days. Immunity experiments with monkeys showed that ten minimum effective doses of fresh vaccine imparted as good immunity as twenty-thousand. Observations and experiments with material from two cases of doubtful chicken-pox (both with a history of 2-3 years previous vaccination) showed that the "material conferred some immunity against vaccinia and the question arises whether they were chicken-pox, alastrim, or modified smallpox."

The report of the Entomologist consists largely of a general survey of mosquito breeding conditions (mainly anopheline) at various places on the Tanga-Arusha railway—a matter of local interest. The Anopheles found were *A. gambiae* (= *costalis*), *funestus*, *cinereus*, *marshalli*, *natalensis*, *pretoriensis*, and *rhodesiensis*. The continuation from 30th April to 24th August of the rat and rat-flea survey of the last Report includes for the 117 days *Mus rattus*, 453; *M. norvegicus*, 9; *Xenopsylla brasiliensis*, 491, with an average of 1.1 per rat; *X. cheopis*, 256, with an average of 0.56 per rat.

A. A.

ZANZIBAR. Annual Report of the Biological Division for 1928
[MANSFIELD-ADERS (W.).—*Zanzibar Protectorate Ann. Rep. Med., San. & Biol. Divisions for Year 1928*. IX.—Scientific. pp. 55-70.

The bulk of the Report of the Economic Biologist relates to helminth infestations.

First place is given to details of a quantitative study of Hookworm infestation in groups of natives from various places specified. The incidence in the whole Protectorate is given as 95 per cent., the north-western areas being the more heavily infected; but the climatic conditions and all soils throughout the Protectorate (even for short periods the sea-beaches, so delectable for the matutinal rite) are favourable for the growth of the larva, and soil pollution is everywhere rife. The average number of ova per gm. of faeces for all groups investigated is between 3,000 and 4,000, and from this and other data it is inferred that the average number of worms individually harboured is about 100. Notwithstanding the high incidence of infection the study of its quantitative distribution is regarded as not menacing. The percentage of Necator found is given as 80. The incidence of Ascariasis is given as 27.3 per cent., but in some villages in the more heavily infested southern parts it was found to be over 80 per cent. Ova of an Ascaris were observed in the faeces of wild pigs. *Trichuris trichiura* infestation is given as 72 per cent., but Tapeworm is stated to be practically unknown in man. Of 411 school children (from all parts of the island) examined 87 showed eggs of *Schistosoma haematobium* in the urine. *Isodora ovoidea* is presumed to be the molluscan host.

The results of a rat-flea survey continued for a year show 243 rats (126 *norvegicus* and 117 *rattus*) continuously caught, and 1,466 fleas—

an average of 6 per rat—all but 31 being of the genus *Xenopsylla*, namely, *X. cheopis*, 970; *X. brasiliensis*, 460; *X. astia*, 5 caught on *norvegicus*.

A. A.

MAURITIUS. Annual Report of the Bacteriological Laboratory for the Year 1928 [BARBEAU (L. G.), Supt. Bact. Lab.]—*Mauritius Ann. Rep. on Med. & Health Dept. 1928.* Appendix I. pp. 16–22.

In the course of routine 431 bloods were examined specially for filaria embryos, and these were found in 109 of them, 100 being *ban-crofti* and 9 an unidentified (unsheathed) species. In 480 specimens of sputa tubercle bacilli were found in 96. Of 953 specimens of faeces 646 contained *Trichuris*, 260 hookworm, 219 *Ascaris*, 16 *Strongyloides*, 16 *Clonorchis sinensis*, 1 *Schistosoma haematobium* (origin ambiguous), 52 *Entamoeba histolytica*, 72 *Giardia intestinalis*, 21 *Chilomastix mesnili*, 19 *Trichomonas*, and 216 *Blastocystis*. Of 695 urines 53 contained eggs of *Schistosoma haematobium*. Five specimens of squamous epithelioma and 5 excised appendices contained eggs of *Schistosoma*. Of 97 pathological growths removed 42 were neoplasms, among which were 19 epitheliomata and 8 carcinomata, and 7 sarcomata.

During the current year 2,022 new-borns received B.C.G. vaccine. Definite information also was obtained of 1,086 of the infants that were thus vaccinated in the previous year; "the death-rate from all causes among these was 5.89 per cent., against 13.15 per cent. for children of the same age in the whole Colony." To elucidate the "periodic" behaviour and the fate of blood filaria in local mosquitoes experiments were carried out with *Aedes aegypti*, *Ae. albopictus*, and *Culex fatigans*, all being fed in the daytime on patients certified a few minutes beforehand; but whereas the embryos completed their larval development in the *Culex*, in the two species of *Aedes* development was early frustrated in the muscles of the thorax. Much study, without much avail, was given to the locally frequentative and mistrusted *Blastocystis*. Wide, close and prolonged search was sustained by Student CANTIN for the local intermediary host of *Schistosoma haematobium*. In all 3,902 pond-snails were dissected, and cercariae were found in 300 of them (in 117 *Limnaea mauritiana*, 182 *Melania tuberculata*, and 1 *Melania acanthica*—but none in *Paludina vivipara*). Six different "types" of cercariae were recognized, but none possessed the characters of *S. haematobium*. Local monkeys, certified urine and faeces free, and part shaved, were bathed in water heavily charged with the active cercariae; snails from waters believed to be clean were kept for more than 3 months in water mingled with fresh urine containing eggs of *S. haematobium*; neither the local ways of this species nor any cue to its local intermediate host were revealed.

A. A.

LIM (C. E.). Peiping Union Medical College Hospital. Annual Report of the Department of Pathology June 30, 1929.—7 pp.

Complaint is made of the difficulty of obtaining autopsies. Mention is made of the large number (44 cases) of bacillary dysentery where the organism isolated does not conform to any recognized type of dysentery bacillus. The tubercle bacillus was discovered in a specimen of milk.

A "Laboratory Manual of the Division of Bacteriology" has been published for local use and a Chinese edition has been prepared for publication. Faecal examinations numbered 10,613 specimens from 4,466 cases. The parasites observed in these cases were *Entamoeba histolytica*, 10·2 per cent. (a large majority being passive carriers under treatment for diseases other than amoebiasis); *E. coli*, 14·6; *Endolimax nana*, 12·1; *Councilmania lafleuri*? 0·42; *Iodamoeba buetschlii*, 2·8; *Giardia lamblia*, 2·4; *Trichomonas hominis*, 2·3; *Chilomastix mesnili*, 1·1; *Ascaris lumbricoides*, 32·0; Hookworm, 6·5; *Trichocephalus trichiuris*, 5·0; *Enterobius vermicularis*, 0·11; *Clonorchis sinensis*, 0·54; *Schistosoma japonicum* 0·04; *Hymenolepis nana*, 0·40; *Taenia*, 0·67; *Fasciolopsis buskii*, 0·02; *Strongyloides stercoralis* 0·04; *Dicrocoelium dendriticum*, 0·06; *Trichostrongylus orientalis*, 0·02.

A. A.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. 1930.

Aug. 1. Vol. 70. No. 8. pp. 756-777. With 2 charts. [1 ref.]

—Jaarverslag van het Militair Geneeskundig Laboratorium over het jaar 1929. [**Annual Report of the Military Medical Laboratory in 1929.**]

The total number of diagnostic examinations amounted to 20,209 in 1929. From the reports of the separate departments (tropical pathology, parasitology, bacteriology, pathologic anatomy) the following items may be quoted:—

In amoebic dysentery a substitute for Yatren, natrium iodo-oxychinolin sulfonicum, proved to be equal in its therapeutic effect to the original Yatren 105. Experimental research on "tropical typhus" has not yet yielded any definite result. The importance of systematic search for tropical typhus by means of the Weil-Felix reaction is emphasized. The examination of samples of faeces for worm eggs was regularly performed by means of the cedar oil method besides the usual eosin preparation. *Ascaris* eggs were found in 57·4 per cent. of the specimens tested, a frequency never seen before.

W. J. Bais.

REVIEWS AND NOTICES.

CALCUTTA. Annual Report of the Calcutta School of Tropical Medicine, Institute of Hygiene and the Carmichael Hospital for Tropical Diseases 1929 [ACTON (H. W.), Director].—116 pp. With 6 plates & 2 charts. 1930. Calcutta : Bengal Govt. Press.

The Report of the Calcutta School of Tropical Medicine, Institute of Hygiene, and Carmichael Hospital for Tropical Diseases consists of brief summaries of the outstanding work of each particular department of those institutions. Much of this work has already been published and a great deal of it is reprinted in the appendices accompanying the Report, so that it now asks no extensive narrative.

In the department of Tropical Medicine the epidemic dropsy form of beriberi, infantile cirrhosis of the liver, and tropical splenomegaly have been specially studied. In Bacteriology cum Pathology, a wide systematic study of bowel-diseases and the beginning of a comprehensive investigation of affections of the skin are reported. In Protozoology, experimental cultivation of protozoa, and studies in malaria with particular reference to the geographical and seasonal distribution of the three species of parasites of man are specially mentioned, and also the diagnosis of malaria by culture-methods, and the subject of spirochaetosis transmission. In Serology and Immunology, blood-grouping tests, precipitin tests for blood-sucking insects, and serum-changes in tropical disease have been prominent objects of attention. In Pharmacology, study has been devoted to the action of cinchona alkaloids, to the therapeutic value of indigenous medicinal plants, to the lethal effect of various arsenical and other drugs on blood-filariae, to the subject of "drug addiction," and to the physical properties of blood-sera. In Entomology, healthy activity in field-surveys and specific experimental work, and in all that relates to the teaching of medical entomology is recorded. The report of the Professor of Hygiene mentions research on the activated-sludge process and its germicidal aspects, and on the freezing-point of Calcutta milk; that of the Professor of Chemistry describes studies of indigenous medicinal plants, of various other drugs, and of beriberi rice; and that of the Professor of Public Health is diligently directed to practical ends.

In the Kala-azar Research Department (Indian Tea Association) careful experiments to discover how *Phlebotomus argentipes* might transmit the infection—whether by its bite or by its being ingested—have so far not been informative. The results of treatment of the disease by stibosan are considered to be highly satisfactory. The Hookworm Research (Indian Jute-Mills Association) reports a working alliance with the local Zoological Gardens. The Bowel-Diseases Research (Indian Mining Association) relates chiefly to cholera stools, the vibrio, and the bacteriophage. From the Leprosy Report (Indian Research Association, and British Empire Leprosy Relief Association) we may recall the statement that of 325 patients who continued in treatment "over one year" all signs of the disease had gone in 110, 134 were much improved, 62 were slightly improved, and 19 were unaltered. Researches were continued in Diabetes (Mitra Endowment) and in Filariasis (Maharaja of Darbhanga Endowment). The Radiology and Electrotherapeutic Department records the specific diseases there treated and the nature and results of the treatment. In the Pasteur Institute for the treatment of rabies the total attendance during the year was 10,219 (the highest on record), of whom 8,099 completed the treatment [results not here stated]. Dogs were the aggressors in 77·8 per cent. of the cases treated, jackals in 20·8 per cent., cats in 0·8, monkeys in 0·5, and man in 0·2 per cent.; horse, cow, leopard, tiger, wolf collectively in 0·2 per cent.

In the introductory report by the Director recent advances in tropical medicine are reviewed, the value of indigenous drugs and the importance

of indigenous sources are emphasized, the systematic study of skin diseases is commended, and recent benefactors of the School are duly remembered.

The admissions to the School for the year were 36 for the D.T.M. class, 20 for the D.P.H., and 41 for the L.T.M.

Appendix A consists of 27 papers by members of the staff of the School, that have been published in the *Indian Journal of Medical Research* or with its Supplements during the year 1929. Appendix B contains 31 papers of the same general authorship and age, that have been published in the *Indian Medical Gazette* for 1929. These collected papers are a convenient record of the researches completed during the year.

A. Alcock.

CALCUTTA. Seventh Conference of Medical Research Workers held at Calcutta on 16th to 21st December 1929.—109 pp. 1930. Delhi: Govt. of India Press.

The delegates to the Calcutta Conference, forty-eight in number and representing all India and Burma, were in session for six days in December 1929 under the presidency of Major-General Sir Henry SYMONS, Director-General I.M.S. After preliminary ceremony the proceedings began with a statement of various proposals now before the Indian Government for harmonizing and systematizing the progress of medical research in India and for conforming it with cognate activities in Great Britain and other parts of the Empire. It was made known that the Government of India had decided that the present Indian Research Fund Association would become also the "co-ordinating agency" for the research enterprises of the prospective All-India Institute of Public Health in Calcutta and of the Central Medical Research Institute at Dehra Dun, and that the governing body of the I.R.F. Association would be correspondingly modified and enlarged for this tri-une status; and it was signified that the proposals for a Recruitment Board and for a Consultative Board in England, for research, were still in consideration. With regard to the Institute of Public Health it was stated that the Rockefeller Foundation had already advanced to the I.R.F. Association 372,000 dollars of the sum promised for its building and equipment, and with respect to the Dehra Dun Institute that it would accommodate the departments of Bacteriology and Immunology, Malaria Survey, Medical Biology (including Parasitology), and Nutrition. After discussion of these statements resolutions were carried (1) urging that if the resources of the I.R.F. Association were directed towards starting "a new Medical Research Institute" its annual grant for its settled "fluid researches" should be maintained intact, and (2) expressing satisfaction with the prospect of closer relations with medical research in Great Britain and the Colonies.

Progress reports of individual researches, set inquiries, and commissions in the programmes of the I.R.F. Association for the year were then heard and discussed. The detail is too diversified and too comprehensive to be considered here; moreover, it either has been or will be made known in other accessible publications, particularly in the *Indian Journal of Medical Research* and *Research Memoirs*—the mouth-parts of the I.R.F.A. Out of these reports resolutions were passed (1) expressing gratification at the appointment of a bacteriologist for the special study of cholera, (2) pressing that the recommendations of the committee on rabies should form the basis of antirabic policy and procedure in India, and (3) recommending the appointment of engineers, versed in the technique of antimalaria work, to the Malaria Survey department.

The Appendices include Dr. ASHESHOV's report on the Bacteriophage inquiry, a report by Lt.-Colonel KNOWLES on the Spirochaetosis-Transmission inquiry, a note by Lt.-Colonel TAYLOR on the report of the Rabies Committee, a statement of the results of the resolutions passed

by the 6th Conference in 1928, and the provisional budget of the I.R.F. Association for 1930-31. In this last document (which also affords a good bird's-eye view of the routes of study followed in 1929-30) research grants in various parts of India are provided for malaria and its pertinency; plague studies and rat-flea surveys; cholera and bacteriophage; the kala azar commission; the treatment and chemotherapy of leprosy; nutrition and dietetics; tuberculosis; an anti-rabic vaccine inquiry; maternal mortality and infant morbidity, etc.; filariasis and other helminthic studies; sprue; indigenous drugs and drug-addiction inquiries; skin diseases; diabetes; the spirochaetosis transmission inquiry; an osteomalacia inquiry; the therapeutics of Weil's disease; formalized vaccines; and for several physiological and biochemical studies.

A. Alcock.

LEITCH (J. Neil) [M.D., Government Pathologist, Sierra Leone] & WATSON (Marion) [M.B., Research Assistant, Sir Alfred Lewis Jones Research Laboratory, Sierra Leone]. **Beriberi and the Freetown Prison. A Report on an Investigation.**—193 pp. With 17 figs. on 12 plates (1 map). 1930. Freetown: Govt. Printer. [10s. 6d.]

An examination of the Freetown Prison records during the last ten years shows that beriberi has been present to a considerable extent in that time; nevertheless, when the present outbreak began, towards the end of 1928, it was at first thought that a hitherto unknown disease was under consideration.

In the past, various Committees had made recommendations for the improvement of the prison dietary, and it is regrettable that these were not carried out, and that owing to faulty control unauthorized diet alterations were made which remained undetected. Hospital records, too, were incompletely kept. Such was the state of affairs when the present investigation was begun in 1929. At this time it was found that out of 252 prisoners, 166 were suffering from beriberi.

From a study of the literature of beriberi the authors found that the consensus of opinion was in favour of a dietary defect as the cause of the disease. With this view they agree. In 1910 a statutory diet was laid down for the prison but unauthorized alterations were made in this, from time to time, and recommended improvements were not carried out. Thus, in the present investigation it was found that the rice was of only average quality, deficient in germ and pericarp, and in some samples infested with weevils. The greens, instead of being spinach, sorrel and crean-crean as recommended, were largely composed of potato leaves and there was a 40 per cent. waste from stalk. In addition, the food was often faultily prepared and cooked. All things taken into consideration, including the condition of the prisoners and their work, this statutory ration was 40 per cent. below the standard. It is not surprising that beriberi outbreaks were common.

A detailed study of the symptoms and signs of the disease is given from which it appears that "wet" cases predominated and that prisoners doing hard manual work were more liable to be attacked. A pre-beriberi stage was recognized and many of the early cases ran a very acute course, dying within a few days of the apparent onset.

Post-mortem examinations were made in some instances and the findings were atypical in the early acute cases. Bacteriological investigations did not support the infective nature of beriberi. There is no organism constantly present in all cases and neither by culture nor serological tests could any one organism be implicated.

It was determined, if possible, to obtain full proof as to the causative rôle of vitamin deficiency in the outbreak. Errors in the preparation and

cooking of the food were eliminated, the full statutory diet was given, tomatoes were used freely and an extra supply of Vitamin B was provided. Groups of prisoners with control groups were thus treated for six weeks with these diets and the authors state that "the fact that no fresh cases arose after their institution and that cases already existing slowly recovered proves conclusively that vitamin deficiency was the cause of the outbreak."

Having thus proved to their satisfaction that the prison diet was defective the authors made recommendations for its improvement as follows: For men convicts a standard diet should contain about 3,400 calories for light labour and 4,000 calories for hard labour. Fresh green vegetables are of the utmost importance and every inch of available ground should be cultivated for this purpose. Lettuce, onions and watercress should be issued raw when in season as an addition to the diet.

Bread should be made of flour composed of half ordinary household flour and half brown flour (80 per cent. extraction). It is also suggested that half a pint of cocoa should be issued at 5.30 a.m.; that 1 oz. of cod-liver oil should be given per head per diem (at any rate as a temporary measure) and that an experimental goat farm be instituted for the supply of milk. A sauce made from liver should be issued with "foofoo" at 10 a.m. Precise instructions as to the preparation and cooking of the food are laid down.

In view of the pre-beriberi state in which many of the prisoners are admitted it is recommended that the practice of giving half diet for the first month of short sentences should be discontinued and that low diets should never be given as punishment.

Finally, various reforms in the Prison Service are suggested. More time must be spent by the Medical Officer in the prison and regular inspections by an Administrative Officer should be carried out.

The authors are careful to point out that their criticisms are directed against the office and not against individuals.

A. Douglas Bigland.

MENSE (Carl). **Handbuch der Tropenkrankheiten.** [Manual of Tropical Diseases.] 3rd Edition. Vol. 5. Pt 2.—pp. vii+847-1418. With figs. 363-556 & plates 6-8 (1 map). 1930. Leipzig: Verlag von Johann Ambrosius Barth. [Paper Rm. 70; Bound Rm. 74.]

The 572 pages contained in this portion of Mense's text book include over 200 pages devoted to literature and index, the literature of each subject being appended to it. The book is divided into two main sections. The first of these, occupying 343 pages, deals with Blood protozoa and the nearly related forms and is written by Dr. R. KUDICKE, of Canton; the second, for which Professor Mense is responsible, is entirely devoted to African human Trypanosomiasis, and occupies 229 pages.

In section one an introduction on structure and development leads up to a consideration of the systematic position of the Blood protozoa. The blood flagellates and allied forms from vertebrates are divided into flagellates possessing one flagellum, but no undulating membrane, with genera *Herpetomonas*, *Phytomonas* and *Leishmania*, flagellates having one flagellum and an undulating membrane with genera *Crithidia*, *Rhynchoidomonas*, *Trypanosoma*, *Schizotrypanum* and *Endotrypanum*, and blood flagellates with two flagella with genera *Trypanoplasma*, *Cryptobia* and *Trypanophis*. KUDICKE differs from REICHENOW, who adopted WENYON's classification of *Herpetomonas* and *Leptomonas*; he argues that as *Leptomonas bütschlii* is a parasite of worms and possesses a contractile vacuole it appears doubtful whether insect flagellates which lack such a structure should be included in the genus *Leptomonas*. KUDICKE retains

PATTON's genus *Rhynchoidomonas*, which WENYON considers should be included in the genus *Herpetomonas*, and he fixes it in the group of flagellates possessing one flagellum, and also an undulating membrane. The name *Schizotrypanum* is retained as the generic appellation of the parasite of Chagas' disease, although this name has been sunk as being a synonym of *Trypanosoma* by many observers.

The Haemosporidia are divided into three families, Leucocytozoidae with genus *Leucocytozoon*, Haemoproteidae with genus *Haemoproteus* (=Halteridium), and Plasmodiidae. This arrangement may be compared with that of WENYON in which the Suborder Haemosporidiidea has two families Haemoproteidae and Plasmodiidae, the genus *Leucocytozoon* being one of the genera of the family Haemoproteidae. In the family Plasmodiidae KUDICKÉ enumerates four genera: *Plasmodium*, *Laverania*, *Proteosoma* and *Haemocystidium*, the first three of which are usually included by British writers in the single genus *Plasmodium*, and the last of which should, according to WENYON, be included under the genus *Haemoproteus* of the family Haemoproteidae. These are a few of the instances—there are many more available—which tend to show that standard text books in different countries are still far from agreement in the classification of the pathogenic and related protozoa. While the nomenclature and classification of the vast majority of protozoa are a matter of indifference except to the specialist, they are not so to the medical man in cases where species pathogenic to human beings are discussed. International agreement as to the proper names of the malaria parasites affecting man, and the parasites causing human trypanosomiasis in Africa and South America—to take examples from this book—would be a step of considerable value.

The section on African human Sleeping Sickness follows beginning with history and geographical distribution, dealing next with pathology symptomatology, etiology and epidemiology and concluding with diagnosis, treatment, prognosis and prophylaxis.

With regard to the question of resistance of human beings to infection with trypanosomes, the views expressed are that man is entirely immune against fly proboscis and gut trypanosomes, and largely so against the *brucei-rhodesiense* parasite in *morsitans* and *pallidipes* areas; such outbreaks as that of the Mwanza epidemic being due to lessening of man's natural immunity by causes such as the stress of war and hunger. The trypanocidal property possessed by human serum is specific, weakened by heating to 56° C., entirely destroyed at 62° C. (syphilitic serum being more resistant) occurs in the eu- and pseudo-globulin fractions, but not in the fibroglobulin and albumin fraction, is diminished in the placenta blood and does not pass the placenta. It is diminished in diseases of the liver, all infectious diseases, ill nourishment and avitaminosis. The serum of man does not act *in vitro* as a trypanocide, it acquires this property only when introduced into the animal body, the serum itself is therefore merely trypanocidogenous. The above summary represents the current views at the time of publication of this Section, but it should be noted that the recent work of YORKE, ADAMS and MURGATROYD, who show that human serum and citrated human plasma are both actively trypanocidal *in vitro* at 37° C. to *T. rhodesiense*, but not to *T. gambiense*, puts a different complexion on the whole subject of the mode of action of human serum as a trypanocide.

In diagnosis by lumbar puncture, while the author admits that this has been practised by the ambulant method in thousands of cases in Africa without ill results, he prefers this operation to be carried out with care, the patient being in bed and kept lying down for a day afterwards.

An account of the various treatments past and present is given and the merits of arsenic, antimony and germanin (Bayer 205) are compared. A treatment by germanin is recommended.

The book maintains a high standard of performance and is excellently printed and illustrated.

D. B. Blacklock.

PAVLOVSKY (E. N.) & others. **Die tierischen Parasiten und einige parasitäre Krankheiten des Menschen in Tadshikistan.** [Collected Papers of a Parasitological Expedition to Middle Asia organized by the Russian Academy of Sciences and Other Institutions.] 1929. pp. iv+208. With 16 plates & 48 text figs. [In Russian, with German summaries.]

In 1928 an expedition was organized under the leadership of Professor E. N. Pavlovsky, of the Military Academy of Medicine, to investigate the parasitic infections in Tadshikistan (the former provinces of Bokhara, the Pamir Plateau and part of Samarkand district bordering with Afghanistan). The present volume containing seventeen papers by various authors comprises the scientific results of the expedition.

Three papers are devoted to malaria and its carriers, one to sandflies, another to a new form of ocular myasis. Other works deal with tick-fever hitherto unrecorded in Turkestan and helminthic infections.

A. A. MAKARJIN (p. 25) and I. I. MASSAITIS (p. 28) describe anti-malarial measures in Eastern Bokhara and in the town of Kuljab. The bionomics of *Anopheles superpictus* is described by N. I. LATYSCHEW (p. 41). E. N. Pavlovsky (p. 60) observed cases of ophthalmomyiasis in man caused by the larvae of *Oestrus ovis* and *Rhinoestrus purpurcus*. A paper by P. P. PERFILJEV (p. 20) deals with the classification and distribution of sandflies in Tadshikistan and Uzbekistan. E. N. Pavlovsky (p. 84) discusses the rôle of *Ornithodoros* in the transmission of relapsing fever in Middle Asia. *O. pallidipes* Birula is, according to this author, the only definitely proved vector in Middle Asia capable of transmitting the disease to man and laboratory animals. The actual transmission is effected through the saliva during the act of ingestion. In this species the coxal fluid and faeces play no rôle, since they are not excreted in the act of feeding. The mechanism of infection in other species of *Ornithodoros* may be different and should be established experimentally since it probably varies with the physiological and biological differences between them. The most common species in Middle Asia are *O. pallidipes* and *O. lahorensis*. *O. kholodkovskiy* n. sp., and *O. coniceps* (= *O. talaje* var. *coniceps*?) were found in isolated cases only. *O. pallidipes* occurs chiefly in dwellings, where it is found all the year round in wall fissures and among the refuse. It is found on man only exceptionally, while *O. lahorensis*, on the contrary, remains on its host during the winter months and in the nymph stage. The full grown nymphs leave their host in the spring. *O. lahorensis* is found on the walls of the dwellings in spring and in summer. Writing of the history of the discovery of the spirochaete of relapsing fever the author notes that already in 1878 in a letter to the editor of "Letopis Vratheb-naya" ("Medical Chronicle"), G. N. MINCH suggested that typhus and relapsing fevers were transmitted by parasitic insects feeding on human blood. It is thus claimed that the idea of transmission of infectious diseases by insect vectors originated in Russia. Little attention was paid to MINCH's suggestion which was forgotten, although he referred to it in more definite terms again in 1892 in "Vratch" ("The Physician").

Another paper by the same author (p. 131) deals with elephantiasis arabum in Tadshikistan. A number of cases are described in which the legs, scrotum and penis were affected. Microfilariae could not be detected.

G. G. SMIRNOV (p. 143) examined 408 inhabitants of the town Dushambé for intestinal worms, 54.41 per cent. of which were infected as follows: *Trichocephalus trichiurus* in 43.87, *Ascaris lumbricoides* in 18.38, *Enterobius vermicularis* in 3.67, *Hymenolepis nana* in 1.96, *Taenia saginata* in 0.72 per cent. These figures include the indigenous population and soldiers of the Red Army stationed in the country, the incidence in the latter being lower.

A number of cases of echinococcosis are described by L. F. PARADOKSOV (p. 164). E. N. Pavlovsky (p. 168) gives an account of the local sanitary conditions as they affect the spread of helminthic invasions in the native population (Tadjiks). In another article, E. N. Pavlovsky and A. K.

STEIN (p. 186) describe the poisonous effect upon human skin of the beetle *Paderus albipilis* which is similar to that of other members of this genus previously described. These authors also describe (p. 190) the irritant and vesicant effects upon human skin of the beetles *Epicauta erythrocephala*, and various species of *Mylabris*. Owing to the abundance of these insects in Middle Asia there is a possibility of utilizing them for medicinal purposes.

At the end of the volume a programme for future parasitological investigations in Turkestan is set forth by the editor.

C. A. Hoare.

SOCIEDAD ARGENTINA DE PATOLOGIA REGIONAL DEL NORTE. Quinta Reunión . . . celebrada en Jujuy del 7 al 10 de Octubre de 1929.
[Fifth Meeting of Pathological Society of Northern Argentine.]
Vol. 2.—pp. 707–1534. With numerous illustrations. 1930.
Buenos Aires: Imprenta de la Universidad.

This is the second and concluding volume of the proceedings of the 5th Congress of the Northern Argentine Pathological Society (see this *Bulletin*, Vol. 27, p. 863) which was held in October, 1929. The wide range of subjects discussed and papers read shows that the Society is a very live one, though naturally most of the contributions are mainly, if not solely, of local interest. This being so, there is no need here to do more than point out the nature of the work accomplished.

This second volume comprises in all 83 papers, which are divided into 7 sections. The first is concerned with Malaria and Haematology; in this there are 14 papers, 9 dealing with some aspect of malaria. Some are clinical records, others deal with the relation between rice cultivation and the spread of malaria in Tucumán, and the flight of anopheles, while the haematological papers treat of blood grouping and blood chemistry. The second section consists of 8 contributions on endemic goitre and iodine metabolism. The section of Parasitology far exceeds the rest in number of contributions; there are 15 dealing with protozoological questions, mainly with protozoa affecting animals; there are 5 treating of amoebiasis in man, but of no particular importance except as clinical accounts of cases. In the subsection of Helminthology also animal infection occupies the greater part, that regarding man being almost confined to records of examination to estimate the degrees of infestation in comparatively small areas. There are 9 contributions in the division of Pure and Applied Entomology; 3 of these deal with myiasis and 1 by Professor LIEBERMANN is on inter-insect warfare and its practical application to the service of man. This does not go very deeply into the subject and is largely of agricultural interest. The last 3 sections of the volume comprise in all 25 papers on a variety of subjects, covering clinical descriptions of cases both medical and surgical, but all of general, not particularly of tropical, interest; others deal briefly with local regulations for improving milk supply, with school hygiene in Salta, with questions of natural history and the historical side of medicine.

The illustrations are good and adequate in number, while the coloured plates are excellent, and the editors are to be congratulated on having brought their labours to so successful an issue, for the task, even if a labour of love, must have been a heavy one.

H. H. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES
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[No. 12.]

HELMINTHIASIS.

LEIPER (R. T.). **Landmarks in Medical Helminthology.**—*Jl. Helminthology*. 1929. June. Vol. 7. No. 2. pp. 101-118.

This closely written historical survey cannot be satisfactorily abstracted. Tapeworms, ascaris and female threadworms were known long before HIPPOCRATES to Europeans at least, guineaworm in 1598, and the internal structure of *Ascaris lumbricoides* in 1683. An outbreak of mucous fever lead to the discovery of the whipworm in 1760. Hydatids were shown in 1782 by their hooks and suckers to be related to tapeworms. Measly pork was known in 1276. RUDOLPHI at the beginning of the nineteenth century was a strong supporter of the doctrine of spontaneous generation of worms. The male threadworm was first described by BREMSER in 1819. Alternation of generation in distome parasites was put forward by STEENSTRUP in 1842, who linked together many isolated facts. In 1850 HERBST began experimental helminthology by transmitting *Trichinella spiralis* in feeding experiments. KÜCHENMEISTER in 1852 showed by such means that bladderworms became tapeworms and at this time BILHARZ discovered blood flukes. The value of routine microscopic faecal examination for helminth eggs was first recognized by DAVINE in 1857. FEDTSCHENKO traced the life history of the guineaworm in 1870. Timothy LEWIS reported microfilariae in the blood in [1874]. In 1876 BANCROFT found the adults in a lymphatic abscess, and in 1877 MANSON announced their development in *Culex fatigans*, but their return to man had to wait till 1900 for its demonstration by LOW. McCONNEL demonstrated *Distoma sinense* in the bile ducts of Chinese in Calcutta in 1875, and LEWIS and McCONNEL in 1876 named *Amphistoma hominis* from specimens which had lain undescribed in the Medical College, Calcutta, for 22 years. In 1877 *Anguillula stercoralis* and *A. intestinalis* were found by NORMAND, LEUCKART showing in 1882 that they were succeeding phases in the development of the same species. In 1878 RINGER found a pulmonary fluke and in 1880 COBBOLD, who received it through MANSON, named it *Distoma ringeri*; this constituted the first record of paragonimus infection. PERRONCITO established the hookworm about this time as the cause of miners' anaemia and BOZZOLO introduced thymol as its treatment in 1881. *Diphyllbothrium latum* had its life history partly solved by BRAUN in 1882, MANSON having

discovered a larval stage of this type of worm in 1881, named *Ligula mansoni* by COBBOLD in 1883. Bothriocephalus anaemia was described by BOTKINE in 1885, the oral route of hookworm infection by LEICHTENSTERN in 1887 and of *Strongyloides stercoralis* in 1890, embryos of *Filaria diurna* and *Filaria perstans* by MANSON in 1891. GRASSI and ROVELLI in 1892 traced *Taenia flavopunctata* through the rat flea and *T. nana* forming cysticercoids directly in the intestinal villus. *Filaria volvulus* in subcutaneous nodules was identified by LEUCKART in 1893, the skin infection of *Ancylostoma duodenale* established by LOOSS in 1898, *Necator americanus*, a new hookworm of man, by STILES in 1902. The lateral spined schistosome egg was noted by MANSON in 1902, and the Japanese blood fluke by KATSURADA in 1904. In 1912 Leiper showed that *Loa* developed in two species of Chrysops. The work of the Rockefeller Foundation, and the history of the discovery of an intermediate host of the schistosomes by MIYAIRI in Japan, and by Leiper in Egypt, are noted, and the way in which the latter proved the existence of the separate adult forms *S. haematobium* and *S. mansoni*. There are mentioned the use of antimony tartrate by CHRISTOPHERSON and emetine by DIAMANTIS in 1918 for the treatment of schistosomiasis, the tracing of the life history of paragonimus by NAKAGAWA in 1914, the pulmonary route of ascaris infection by STEWART in 1916, the life cycle of *D. latum* completed by ROSEN in 1917, the complement deviation test for schistosomiasis by FAIRLEY in 1919, the life history of *F. buskii* in 1920 by NAKAGAWA, of heterophyes by ONDI and NISHIO in 1923, of *Onchocerca volvulus* by BLACKLOCK in 1926 and *F. perstans* in 1927 by DYCE SHARP. That *Ligula mansoni* can enter wounds from split frogs used as a poultice was shown by FAUST in 1928. Recent treatment of hookworm infection with carbon tetrachloride and tetrachlorethylene is mentioned.

Clayton Lane.

CARMAN (John A.). **Observations on the Incidence of Helminthic Infestations in Natives of Kenya, with Special Reference to Taeniasis, its Effect on Nutrition and its Treatment with Carbon Tetrachloride.**—*Jl. Trop. Med. & Hyg.* 1929. Nov. 15. Vol. 32. No. 22. pp. 321-328. [38 refs.]

" (1) Examinations of the reformatory and prison inmates in the highlands of Kenya revealed the following facts:—

" (a) A high incidence, 57·9 per cent. of light infestations with hookworm.

" (b) An incidence of *Taenia saginata* of 50 per cent. in children and 77·2 per cent. in adults.

" (2) In Africa the diagnosis of taeniasis may be conveniently and accurately made by washing whole stools after purgation and searching for segments.

" (3) Carbon tetrachloride in graduated doses up to 4 cc. gave an efficacy of 76·1 per cent. cures in light infections with hookworms and of 97 per cent. against light infections with *T. saginata*. Combined with oil of chenopodium the efficacy against heavy infections of *Taenia* was 69·5 per cent.

" (4) In view of the digested state of tapeworms passed after treatment with carbon tetrachloride, it is suggested that this drug may act by upsetting the power normally possessed by this parasite of resisting the action of the intestinal enzymes.

" (5) The drug should not be used in the mass treatment of a debilitated population unless all patients can be interrogated as to their present condition and recent illnesses.

"(6) Nutrition is definitely shown to be adversely affected by the presence of infestations with *Taenia saginata* in growing boys, a fact which is demonstrated by a consideration of the rates at which they gained in weight before and after treatment."

C. L.

- i. CHESNEAU (Pierre). L'helminthiase au Cammon, province du Moyen-Laos. [**Helminth Infestations in Middle Laos.**]*—Bull. Soc. Méd.-Chirurg. Indochine.* 1929. June & July. Vol. 7. Nos. 6 & 7. pp. 289-303; 342-351. With 1 map in text. Also in *Ann. de Méd. et de Pharm. Colon.* 1929. July-Aug.-Sept. Vol. 27. No. 3. pp. 369-390.
- ii. GENEVRAY (J.). Helminthiase chez les tirailleurs Tonkinois. [**Helminth Infestations in Tonkin Tirailleurs.**]*—Bull. Soc. Méd.-Chirurg. Indochine.* 1929. July. Vol. 7. No. 7. pp. 339-341. [Pasteur Inst., Hanoi.]
 - i. Stools were brought to a central laboratory in 2 per cent. formalin solution, and there examined by smear. They totalled 2,470 and 82·6 per cent. contained parasites. The species percentages were as follows: *Ascaris* 63, hookworms 26·7, trichuris 32·9, enterobius 0·4, strongyloides 1·1, *T. solium* 2·2, *T. saginata* 0·2, *Opisthorchis* 15·9, *Fasciolopsis buskii* 0·7. The distribution by age, sex and district are also given.
 - ii. In a single examination, presumably a smear, from each stool of 1,000 healthy tirailleurs, infections found were: *Ascaris* 71·6, trichuris 41·5, hookworms 16·6, *Clonorchis sinensis* 1·4, tapeworms 0·9.

C. L.

- i. VOGEL (Hans). Helminthologische Beobachtungen in Ostpreussen, insbesondere ueber *Dibothriocephalus latus* und *Opisthorchis felineus*. [**Helminthological Observations in E. Prussia, especially on *D. latus* and *O. felineus*.**]*—Deut. Med. Woch.* 1929. Sept. 27. Vol. 55. No. 39. pp. 1631-1633. With 2 text figs. [1 ref.] [Inst. for Ship & Trop. Diseases, Hamburg.]
- ii. —. Beobachtungen ueber *Dibothriocephalus latus*.—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 164-167 (248-251).
 - i. Vogel examined 25 stools in East Prussia by Telemann's method and found these infections: *Diphyllobothrium latum* 8, *ascaris* 13, *Opisthorchis felineus* 2, trichuris 21. It is believed that all adults of the region are affected with the broad tapeworm, but anaemia was not observed; 5 of 9 dogs were infected in Rossiten. *Diaptomus vulgaris* is implicated as a new first larval host, and infection passes to man through his eating the imperfectly cooked liver of the burbot; it is thought that this liver therapy may conduce to preventing anaemia. Dog and cercopithecus were artificially infected. Tench, roach, and bleak act as larval hosts to *O. felineus*, the first being particularly susceptible.
 - ii. Investigation of a considerable number of stools showed 36 per cent. infected with *D. latum*, while taking adult fisher folk only the percentage was 100. The burbot liver, it appears, is spread raw on bread and butter, and eaten seasoned with salt and pepper. Infected children (the youngest was 6) were pale and poorly nourished, but typical anaemia was not found, and is held to be due neither to toxic strains of

worm nor to the liberation of toxins by its decomposition, but to the disposition of the host ; and as regards the suggestion that it is eating liver which aids in preventing anaemia it is noted that six men in the Navy who had acquired the broad tapeworm in their East Prussian home, and had there suffered from no anaemia, did so suffer during their naval service. Evidence is also given that the worm may cause gastro-intestinal catarrh.

C. L.

ORTIZ DE LANDAZURI (A.). Parasitismo intestinal en un grupo de niños. Algunos datos de interés relacionados con su diagnóstico y tratamiento. [**Intestinal Parasites among a Group of Children.**]—*Medicina Países Cálidos*. Madrid. 1930. Mar. Vol. 3. No. 2. pp. 138-147. [10 refs.] French summary.

Examination by Willis's method of the stools of 100 children between the ages of 7 and 13 years revealed 38 with helminthic infestation. Eleven of these had hymenolepis ; they had lived all their lives in Madrid. Treatment with oil of chenopodium did not prove effectual, but after male fern—two treatments at 30 days' interval—the ova were no longer seen in ten of them. Other infestations were : Trichuris 14, giardia 11, oxyuris 3, strongyloides 2. Eosinophilia was not a marked feature ; it was found in 10 only, and in them to a varying degree. Using a 50 per cent. sugar solution, he found that eggs of taenia, ankylostome and strongyloides floated and this solution yielded the same intensity of eggs as the concentrated salt solution.

H. H. S.

BACIGALUPO (Juan). Estudio helmintológico de 100 apéndices de extirpación quirúrgica. [**Helminthological Examination of 100 Excised Appendices.**]—*Prensa Méd. Argentina*. 1930. July 10. Vol. 17. No. 4. pp. 252-255. [4 refs.]

Twenty-six were from men, 74 from women. Of the former, 4 contained worms, of the latter 21. Enterobius was found altogether in 24 ; in 18, female worms only were present, in 5 both males and females, in one a male only ; the number of worms varied between 1 and 17. One appendix contained a solitary trichuris. Of the patients whose appendices contained parasites 5 were under 20 years, 11 between 20 and 30, and 9 over 30.

H. H. S.

FÜLLEBORN (F.) & KIKUTH (W.). Ueber Cutanreaktionen bei Helmintheninfektionen. [**Skin Reactions in Helminth Infections.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 168-171 (252-255).

— & —. Ueber die Allergie des Menschen gegenüber Ascaris. [**Allergy in Man against Ascaris.**]—*Klin. Woch.* 1929. Oct. 22. Vol. 8. No. 43. pp. 1988-1995. [29 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

That parasitic worms equally with bacteria produce a toxin to which the body reacts with an antitoxin is instanced by the Casoni reaction for hydatid, Fülleborn's reaction for strongyloides, and that for schistosomiasis associated with the names of FAIRLEY, WILLIAMS and

MANSON-BAHR. Yet for a number of worms such a reaction is not more than a group one. The authors discuss more fully the question of ascaris, obtaining their material from the pig. Of 58 persons the intradermal reaction was positive in 13, but in 8 only was there a history of previous or existing ascaris infection or sensitization. The authors were able to activate passively the skin of non-sensitive persons with the serum of patients showing a high ascaris sensibility. (Positive Prausnitz-Küstner experiment.) It is pointed out that the ascaris antigen is protein-free and lipoid-free and is not destroyed by heating, while the antibody is so destroyed at 56°C. maintained for three hours. The antibody loses its effect if mixed *in vitro* with antigen. At their suggestion WESTENDORFF showed that the cutaneous reaction failed in six cases of deep narcosis, corresponding with the observation that a sensitized animal deeply anaesthetized will withstand a dose of antigen which would otherwise be fatal, and falling in with KELLAWAY'S observation that anaphylactic shock is frequently absent in an operation under deep anaesthesia for hydatid. The cutaneous reaction was stopped by ephedrin also. An experiment is described confirming the protein-free and lipoid-free character of the ascaris antigen.

A non-sensitive person could be sensitized by an intradermal injection of the antigen. The authors were not able to produce anaphylaxis either through subcutaneous, intraperitoneal or intravenous injections, or by inhalation. The Dale experiment with the uterus of a virgin guineapig was likewise negative. In two rabbits the subcutaneous injection of antigen produced complement fixation substance in their serum.

C. L.

SOROUR (M. F.). **Chronic Parasitic Funiculitis in Egypt.**—*Lancet*. 1929. Oct. 5. pp. 708-710. With 6 text figs.

Ten years' experience in examining pathological material sent to Cairo from all over Egypt shows that nodules up to the size of a pigeon's egg are not uncommon in the spermatic cords of fellaheen. They are caused by one of two helminthic infections, filarial or bilharzial. Sorour had recognized a chronic eosinophilic funiculitis for years, characterized by fibrosis, heavy eosinophil infiltration, and thickened blood vessels often thrombosed. A chance section revealed a filaria and re-examination of old material found the same "in each case." Nevertheless a second type of funiculitis caused by bilharzia ova is recognized, having the usual characters of bilharzial tumours.

C. L.

VON OETTINGEN (W. F.). **Comparison of Various Lactones with Santonin. I. Studies of Chemical Constitution and Pharmacological Action.**—*Jl. Pharm. & Experim. Therap.* 1929. July. Vol. 36. No. 3. pp. 335-354. With 3 figs. [23 refs.]

— & GARCIA (F.). **The Toxicity and Vermicidal Properties of the Dilactone of Acetone Diacetic Acid and Beta Angelica Lactone in Cats. Dilactone and Beta Angelica Lactone as Anthelmintics.**—*Ibid.* pp. 355-362. [School of Med., Western Reserve Univ., Cleveland, Ohio.]

Since the importance of the lactone group in the santonin molecule is still unsettled, experimental studies on certain lactones were under-

taken. They are all depressant and lethal to earthworms. The "most effective" were investigated on ascarids of cats, namely β -angelica lactone and the dilactone of acetone diacetic acid. The former was very toxic to cats; the latter was tested for toxicity in four animals in doses of 1.0, 1.8, 2.3 and 2.6 gm. per kilo. There was no distinct effect in the first two, and slight depression in the second two. Accordingly, it was given as an anthelmintic to ten more in doses between 0.2 and 0.8 gm. per kilo. In 7 of the ten cats these doses removed all worms; in the others, 7 of 19, 24 of 53, and 5 of 6. The totals were checked by autopsy.

C. L.

ROSS (I. Clunies). **Some Observations on the Bionomics of *Fasciola hepatica*.**—*Japanese Jl. Experim. Med.* 1930. Apr. 20. Vol. 8. No. 2. pp. 65–69. [6 refs.]

In Tokyo, Ross studied *Fasciola hepatica* developing in *Limnea peruvia* for 79 days in summer and 64 days in autumn. With temperature between 24° C. and 32° C. or even 35° C. cercariae began to escape from snails in about 5 weeks, and were still doing so after 11, at which time very immature cercariae were still contained in rediae in dissected snails. With average temperatures between 15.5° C. and 20.5° C. for 33 days, and between 9.8° C. and 16.2° C. for the next 31, development produced almost no motile cercariae. It is reasonably inferred that, where the maximum temperature of water does not exceed 10° C. in winter time, development ceases. Daughter rediae were found numerous with the falling temperature of autumn, but cercariae were also present at that season in considerable number. Contrary to earlier observations, encystment of cercariae took place at relatively low depths, 18 of 250 being found below 4.5 cm. from the surface, 10 below 7.5 cm., and 6 on the bottom at 10.5 cm. This implies an increased likelihood of survival when shallow pools are drying up.

C. L.

PAUL (Fritz). Lebergelseuche (Distomiasis hepatica) beim Menschen. [*Fasciola hepatica Infection in Man.*]—*Seuchenbekämpfung.* Vienna. 1928. Vol. 5. No. 2. pp. 119–129. With 8 text figs. [Kaiser Franz Josef Hosp., Vienna.]

In the autumn and winter of 1926 there was a heavy veterinary epidemic of illness caused by *Fasciola hepatica* with three human cases, of whom two died. One of the figures, that of a faecal smear, shows an egg of this parasite and two of trichuris.

C. L.

KRUKOW (A. N.). Le nouveau symptôme parmi les signes de la distomatose hépatique. [**An Additional Sign of Hepatic Distomiasis.**]—*Pensée Méd. d'Usbekistane.* Tashkent. 1927. Dec. No. 3. pp. 87–89. [In Russian. French summary p. 138.]

The summary states that in a woman of 30 with hepatic distomiasis a particular part of the liver would rapidly swell and as rapidly shrink. The condition is attributed to intermittent biliary obstruction by the parasites.

C. L.

RAJCEVIC (M.). Wie lange bleiben die Cercarien der Leberegel (*Distom hepaticum*) am getrockneten alten Heu lebend und infektiösfähig? (Ein Beitrag zur Ätiologie der Distomatosis.) [**Length of Life of Cercaria of Liver Fluke in Dried Hay.**—*Deut. Tierärz. Woch.* 1929. Aug. 24. Vol. 37. No. 34. pp. 535–537. [Vet. Faculty, Univ., Zagreb.]

In stacked hay cercariae of *F. hepatica* remained alive for at least 17 months, that is, for two summers and one winter. In the sheep investigated no rams were infected.

C. L.

RYOJI (S.). Therapeutische Studien ueber die Clonorchiasis. Experimentelle Studien ueber die therapeutische Wirksamkeit des Stibenyl, Stibosan und Antimosan auf Kaninchenclonorchiasis. [**Therapeutic Studies on Clonorchiasis in Rabbits.**—*Okayama-Igakkaï Zasshi* (Zent. d. Okayama Med. Gesellsch.). 1927. Nov. Vol. 39. No. 11 (No. 454). pp. 1809–1823. [6 refs.] [In Japanese. German summary pp. 1824–1825. With 6 figs. on 3 plates.] [Med. Clinic, Univ., Okayama.]

Stibosan and antimosan are a quarter as toxic to experimental animals as tartar emetic, and stibenyl is an eighth as toxic. *In vitro* against *Clonorchis sinensis* antimosan is the strongest and stibenyl the weakest of the series. *In vivo* stibenyl in dosage of 0.24 to 0.8 gm. per kilo and stibosan in total dosage of 0.24 to 0.48 gm. per kilo greatly damage the worms in the bile passages, but apparently, as judged by egg counts, do not lessen their numbers, whereas antimosan does not appreciably damage the worms, but greatly lessens their number [an anomalous result]. The liver changes found in treated cases were judged to be less than those found in controls. Antimosan is held to be four times as effective as stibenyl.

C. L.

ROSS (I. Clunies). **The Effect of Large Doses of Carbon Tetrachloride in the Treatment of Clonorchis and Schistosomum Infestation in the Dog.**—*Japanese Jl. Experim. Med.* 1930. Apr. 20. Vol. 8. No. 2. pp. 71–78. [4 refs.]

As others have experienced, puppies died wholesale after carbon tetrachloride. A dog with *Schistosoma japonicum* died two days after receiving the last of ten treatments in 40 days, each at about the rate of 1 cc. per kilo or 10 cc. per kilo all together. A number of fertile and apparently normal worms were found at autopsy. Four dogs with clonorchis infection were given three doses, each dose varying between 1 cc. and 2 cc. per kilo. One survived to be killed; the other three died, one as the direct effect of the drug getting into the air passages; as regards the others, whether from the drug or the infection seems uncertain. The flukes were badly damaged. [Man has been killed by a thirtieth to a sixtieth of a single one of these doses per kilo.]

C. L.

TAKAHASHI (Shozo). **On the Eggs of Several Kinds of Intestinal Trematodes, which resemble that of *Clonorchis sinensis*, especially the Eggs of *Stellantchasmus falcatus* and *Pygidiopsis summus* found in Human Stools. With a Supplement on the Examinations of the Helminthic Parasites of the Dogs and Cats in Okayama Prefecture.**—*Okayama-Igakkaï Zasshi* (Zent. d. Okayama Med. Gesellsch.). 1929. July. Vol. 41. No. 7. pp. 1502–1512. With 9 figs. on 1 plate. [In Japanese. English summary p. 1513.] [Bact. Dept., Med. Univ., Okayama.]

"The eggs of *Stellantchasmus falcatus* were found in 1·5 per cent. and *Pygidiopsis summus* in 0·3 per cent. in the stools of the natives of Okayama district. No human case of these trematodes has yet been recorded in Japan, owing probably to the fact that the eggs of these trematodes resemble closely those of *Clonorchis sinensis*." The eggs concerned are illustrated by photomicrographs.

C. L.

BEDIER (E.) & CHESNEAU (P.). Distomatose hépatique à *Opist[h]orchis* au Laos (à Vientiane et Thakhek). [**Opisthorchis Infection of the Liver in Laos.**]—*Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 331–334. [3 refs.]

In three autopsies an *Opisthorchis* species was found sparsely in bile ducts. Opinion is reserved as to whether it is *O. felineus* or *O. viverrini*. The corresponding eggs have been found 322 times at Thakhek. The percentage of infections detected here seems to vary between 22·8 per cent. and 9·7 per cent. as judged by stool examination.

C. L.

VOGEL (Hans). Beobachtungen ueber *Cercaria vitrina* und deren Beziehung zum Lanzettegelproblem. [*Cercaria vitrina* and its Relation to *Dicrocoelium lanceatum*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Sept. Vol. 33. No. 9. pp. 474–489. With 7 text figs. [17 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Practically all sheep in the Tyrol are infected with *Dicrocoelium lanceatum*. There are no water snails there, so that infection must be through land snails. In certain of the latter, namely, *Zebrina detrita* and *Helicella candidula*, there were found numbers of *Cercaria vitrina*. Its anatomy is described, and the resemblance of its anatomical arrangement to that of *D. lanceatum* is mentioned. The miracidium of the latter penetrates the gut of *Z. detrita* which has been fed with the eggs, but some second intermediate host is required to complete development.

C. L.

- i. MATHESON (Colin). **Notes on *Cercaria elvae* Miller as the Probable Cause of an Outbreak of Dermatitis at Cardiff.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Jan. 30. Vol. 23. No. 4. pp. 421–424. [3 refs.]
- ii. MATHIAS (Paul). **Sur *Cercaria ocellata* La Valette.**—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 151–160. With 3 text figs. [22 refs.]
- iii. VOGEL (Hans). Hautveränderungen durch *Cercaria ocellata*. [**Skin Changes caused by *C. ocellata*.**]—*Dermat. Woch.* 1930. Apr. 26. Vol. 90. No. 17. pp. 577–581. With 6 text figs. [7 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

- iv. TAYLOR (E. L.) & BAYLIS (H. A.). **Observations and Experiments on a Dermatitis-producing Cercaria and on another Cercaria from *Limnaea stagnalis* in Great Britain.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Aug. 8. Vol. 24. No. 2. pp. 219-244. With 18 figs. (16 on 8 plates). [21 refs.]

i. During the summer of 1928, bathers in a large artificial lake at Cardiff suffered within a few hours of bathing from a blotchy papular dermatitis, many papules having a central puncture-like point. Irritation was intense and scratching produced bleeding. Under some bathing costumes the skin was less affected than on exposed parts. The sufferers felt no bites, and no case occurred among the hundreds of non-bathers who passed that way. All pointed to the water as producing the rash, but investigation of the fauna and flora, including bacteria, of the lake gave no clue to the actual cause. Search of the literature disclosed CORT's report on *Cercaria elvae* as causing a dermatitis (this *Bulletin*, Vol. 25, p. 946). There had been a few cases in 1927. The epidemic reappeared with the bathing season of 1929, but was less extensive than it had been in the previous year, probably because there were fewer bathers, for the news had got round. Then the snail *Limnaea stagnalis*, apparently a recent addition to the local fauna, was found emitting cercariae, which were identified by BAYLIS as being of two kinds, one morphologically identical with *C. elvae*. This was further studied (iv).

ii. In the meantime Mathias found *C. ocellata* escaping from *L. stagnalis* and *L. limosa* and noted that the cercariae fixed themselves to the side of a vessel, and soon re-attached themselves if disturbed. They lived 60 to 65 or even 69 hours, attached themselves rapidly to the skin of fowl or duck and forthwith cast their tails.

iii. Vogel further found that *C. ocellata* usually emerged from the snail about midday and had a strong attraction to light. Following the sacrificial tradition of his laboratory, he applied 34 cercariae to a limited area of his own skin, had this portion cut out 24 hours later, and displayed by serial sections 11 cercariae still in the epidermis. One was surprised on the point of entering the dermis, as the missing ones had probably done and left the area of investigation.

iv. Taylor and Baylis, while drawing attention to ii and iii, note that their observations were made independently and without knowledge of this work, and that they confirm it. They point out that *C. elvae* Miller, 1923, is probably identical with, and so must give way in nomenclature to, *C. ocellata*, La Valette, 1855. They found that the cercariae had so strong a negative geotropism that they could not satisfactorily be concentrated by centrifugal precipitation. This character, with that of phototropism, point to some surface-swimming animal as the proper definitive host. This host was not discovered, but the cercaria closely resembles *Bilharziella polonica* which, as adult, inhabits the mesenteric veins of ducks. The morphology of the cercaria is beautifully illustrated in drawings by Miss REES. Cercariae penetrated mouse skin after casting their tails, and in human skin produced a ground itch persisting for weeks, but no creeping eruption. The other form, "*Cercaria X*," does not annoy man, but enters small fish and reaches the optic lens.

SUDAN. **Report on Medical and Health Work in the Sudan for the Year 1928** [ATKEY (O. F. H.) Director, Sudan Med. Service].—115 pp. (Bilharziasis : pp. 15-22.)

The campaign against schistosomiasis includes quarantine stations, the prevention of fouling of water, destruction of snails, and treatment. The infection is rare in the south, but has been detected at Yei, near the Sudan-Congo-Uganda border. It was noted in Berber that where the intake into irrigating canals was in deep water few snails are distributed ; the matter is being investigated ; infection in school children is less than a fifth of its incidence in 1926. In Dongola there is increased willingness to come for diagnosis and treatment. In the White Nile province, snails, mostly planorbis, are mainly found in the shallow edges of the slow-flowing river, where they cannot in the ordinary way be destroyed, and 50 per cent. are infected. Ducks were avid snail eaters, but apparently could not cope with the numbers in the Blue Nile province ; and there snails are rapidly increasing. A combination of all forms of possible defence is being carried out.

C. L.

SINDERSON (H. C.). **Anomaly of Pigmentation in Schistosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 633-634. With 1 plate.

About 20 per cent. of schistosomiasis cases admitted to the Royal Hospital, Baghdad, show a "butterfly" pigmentation on the face—a darkish brown pigmentation on both cheeks and "along the bridge of [? or] lateral aspects of the nose." Its presence has caused urinary examination with discovery of ova in the urine. *S. haematobium* is the only species in Iraq. The butterfly sign is much rarer in females than in males.

C. L.

SAVERIO (Cerqua). Appendicite da bilharzia. [**Bilharzial Appendicitis.**]—*Arch. Ital. Sci. Med. Colon.* 1930. June 1. Vol. 11. No. 6. pp. 325-327. With 2 text figs. English summary (3 lines). [Umberto I. Italian Hosp., Cairo.]

Sudanese, 30 years of age, suffered with acute abdominal pain, vomiting and extreme meteorism. Appendicitis was diagnosed and operation performed. The excised appendix showed nodules, in the scrous aspect of which were many calcified ova of *S. haematobium* ; the sub-mucosa and muscularis mucosa were fibrotic and contained ova, also calcified.

H. H. S.

CAWSTON (F. G.). **The Rapid Cure of Schistosomiasis.** [Correspondence.]—*Lancet.* 1930. July 12. p. 108.

Two cases are noted where neoantimosan or fouadin produced late vomiting and gastric disturbance. In one the drug had to be discontinued after the third dose, in the other 53.5 cc. were given in 31 days. Normal ova of *S. haematobium* were present in the urine three months later, and it was frequently bloody. Africans were undisturbed by the treatment. The makers reported that a sample from the batch of drug which had produced these symptoms had not altered in composition.

C. L.

- KHALIL (M.) & SALAH EL DIN (M.). **The Microscopical Diagnosis of Intestinal Schistosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 519–524. [3 refs.]

The diagnostic methods used were: (1) The selected smear. The laboratory must receive the whole stool, and a portion containing mucus or blood must be lightly scraped with a flattened glass rod and examined as a watery suspension. (2) The precipitation method. With Khalil's floatation in concentrated salt solution in an Erlenmeyer flask the fluke eggs sink, and are removed by a pipette to a slide. "One preparation will suffice for detecting ancylostoma and schistosoma eggs." [In the abstractor's observation, the validity of which seems never to have been controverted, only a small fraction of the hookworm eggs present are recovered from the surface of fluid in an Erlenmeyer flask.] (3) The rectal swab. The mucus adhering to an unvaselined rubber finger-covering inserted into and scraping the rectum is examined. All 3 methods were used in 58 cases; 54 were positive to 1 rectal swab, 46 to two precipitation examinations and 41 to two smear examinations. In one case the swab was negative, while ova were present in one of the other methods.

C. L.

- OZAWA (Makoto). **Experimental Study on Acquired Immunity to Schistosomiasis Japonica.**—*Japanese Jl. Experim. Med.* 1930. Apr. 20. Vol. 8. No. 2. pp. 79–84. [16 refs.]

Immunization was attempted by infecting dogs and curing them with stibnal, by injecting a suspension of adult worms, and by injecting one of cercariae. Dogs which have been infected and cured or injected as described may become infected subsequently, but the symptoms are milder and fewer worms mature than in controls, while many worms show very poor growth.

C. L.

- CAWSTON (F. G.). **Schistosomiasis bovis in South African Sheep, Cattle and Man.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 641–642. [4 refs.]

S. bovis has caused mortality in sheep in the eastern Province of the Cape and close to Pretoria in the Transvaal, and in man in Durban, Natal. Its distribution appears to coincide with that of *Physopsis africana* in the Union of S. Africa. Tartar emetic has been successfully given to sheep and cattle in Cape Province for schistosomiasis.

C. L.

- LI (H. C.). **The Life Histories of *Diphyllbothrium decipiens* and *D. erinacei*.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 527–550. With 38 figs. on 5 plates. [8 refs.] [Peking Union Med. College, Peking, China.]

Both cestodes use as first larval host any of the 8 local cyclops species, and also *C. affinis*; the second larval host of *D. decipiens* is the frog and of *D. erinacei* the hedgehog. The whole development is fully described and clearly illustrated. A point of more general interest is that a cyclops has swallowed as many as 60 oncospheres in 15 minutes.

Such greed is deservedly fatal ; but cyclops may harbour 10 or 12 proceroids and yet live for some time—indeed, 55 days was noted—and one was dissected 5 days after infection with 27 proceroids. But with these heavy infections, most die in 2 or 3 days.

C. L.

MOTAIS (F.). Considération sur la pathogénie de la sparganose oculaire. [**The Pathogeny of Ocular Sparganosis.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1929. July. Vol. 7. No. 7. pp. 363-368.

A note on the transmission of *Sparganum mansoni* with biological and historical interest. The paper tells that all medical men in Indochina who have met with sparganum infection have remarked on its limitation in man to the ocular region, though in animals it is found in all parts of the body. In the Society's Bulletin for September, 1926, COLLIN suggested that this was due to washing in polluted water. At its meeting in May, 1927, CASAUX presented a woman who had been in the habit of applying beheaded and dismembered frogs to her eyes, and noted that the custom of natives of applying such frogs over the eyes, coupled with the bodily distribution of spargana in man, suggested that there was direct entry of these into the orbital tissues. In 1927 the thesis for doctorate of EVANNO, Veterinary Inspector, arrived at like conclusions. He placed a sparganum in the conjunctival sac of a monkey, and recovered it 11 days later in the upper lid. Motais now recounts four cases of ocular sparganosis. In one, a week after application of a split frog to each eye, the eyes began to itch ; eight spargana were removed from the lids ; in the others like histories and findings were reported. The Hanoi section of the society, at whose meeting on July 25th, 1929, this paper was read, unanimously agreed to the sending to the Governor of a letter urging that steps should be taken to stop this disgusting and dangerous form of poulticing. [To complete the story, FAUST in December, 1928, wrote, as noted in this *Bulletin*, Vol. 26, p. 539, that evidence not yet conclusive favoured the view that the application of frogs to inflamed and ulcerated parts introduced sparganum ; and again in March, 1929, FAUST reported that the normal intermediate host of *D. mansoni* is *Rana esculenta*, and that CAMPBELL had removed spargana from the fingers of two patients who had poulticed them with split frogs.]

C. L.

JOYEUX (Ch.) & BAER (J. G.). Etudes sur le réencapsulement du *Sparganum ranarum* (Gastaldi, 1854). [**Re-encapsulation of *S. ranarum*.**]—*C.R. Soc. Biol.* 1929. Oct. 25. Vol. 102. No. 27. pp. 305-307.

The sparganum of *Diphyllbothrium ranarum* is frequent in snakes in the Mediterranean basin and becomes readily re-encapsuled in cold-blooded vertebrates. The hedgehog carries *S. ellipticum*, Molin, 1858 ; no other warm-blooded vertebrate carries a sparganum in this area. *Sp. ranarum* was fed to two, just imported, English ferrets, there being no infection in England ; they did not grow to adult form, but re-encysted in the intercostal muscles or adjacent subcutaneous tissue, having grown to as much as 7 mm. in length. When fed to dogs, however, adult *D. ranarum* was found in the intestine. The authors

comment on the absence of evidence of bacterial infection when sparganum penetrates. Moreover, they found that on adding spargana to culture tubes of the intestinal contents of a snake, there were after 24 hours half as many bacteria, of *Bact. coli* type, as in control tubes. They point to this as explanation of the rarity of infectious [bacterial] complications after infection with *S. mansoni*.

C. L.

SPINDLER (L. A.). **On the Occurrence of the Rat Tapeworm (*Hymenolepis diminuta*) and the Dwarf Tapeworm (*Hymenolepis nana*) in Man in Southwest Virginia.**—*Jl. Parasit.* 1929. Sept. Vol. 16. No. 1. pp. 38–40. [4 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

In 2,152 faecal examinations made by Stoll's method the eggs of *H. diminuta* were found once and those of *H. nana* 77 times, all but 3 being in children. The cases were found in community, but not in family, groups. The eggs can be recovered from the soil for 4 to 8 days after being placed in it, but were not discovered in soil samples round the premises of infected families. Regarding rats, it is merely said, "No evidence was obtained in this survey which would indicate that rats were responsible for the spread of this parasite in southwest Virginia."

[Are rats free from infection there?]

C. L.

OQUIÑENA ECHALECU (Francisco). La "*Hymenolepis nana*" en España. [*H. nana* in Spain].—*Medicina Paises Cálidos*. Madrid. 1929. July. Vol. 2. No. 4. pp. 305–333. With 4 text figs. [79 refs.]

—. Etudes sur l'*Hymenolepis nana* en Espagne.—*Ann. Parasit. Humaine et Comparée*. 1929. Nov. 1. Vol. 7. No. 6. pp. 469–476. [26 refs.] [Lab. of Parasit. & Trop. Path., Faculty of Med., Madrid.]

Examination of 2,199 persons showed an infection rate with *H. nana* of 6·67 per cent., that in 957 children under 14 being 12·95. In general no symptoms were detected. Treatment by oil of chenopodium requires frequent repetition. It is believed that in Spain infection is as a rule direct, though 10 per cent. of *Tenebrio molitor* fed with onchospheres became infected. Eosinophilia in 22 pure infections varied from 0 to 19. There was often some anaemia.

C. L.

RODRIGUEZ LOPEZ-NEYRA (Carlos) & TORRES LOPEZ (Antonio J.). El *Hymenolepis nana* como parásito intestinal humano en España. [*H. nana* as Intestinal Parasite of Man in Spain].—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* Buenos Aires. 1928. Vol. 3. No. 6. pp. 885–895.

Three more cases are recorded from Spain of infection by *H. nana*. The parasite, it is pointed out, is not uncommon in that country and requires patience to secure complete elimination. In a child born in Brazil it was associated with necator, and in another born in Spain with trichuris and enterobius.

C. L.

KASAKOW (P. T.). Ueber die Verbreitung von *Hymenolepis nana* in Leningrad. [**Spread of *H. nana* in Leningrad.**—*Russian Jl. Trop. Med.* 1928. Vol. 6. No. 9. pp. 588–596. [In Russian. German summary p. 597.]

H. nana has been found in 0.3 per cent. of examinations made in Leningrad; parasitism with it has progressively increased since 1923, as have other worm infections.

Measly pork is being increasingly found in the Leningrad slaughter houses. A campaign is urged.

C. L.

BACIGALUPO (Juan). La evolución del *Hymenolepis nana*. [**Development of *H. nana*.**—*Semana Méd.* 1928. Jan. 26. Vol. 35. No. 4 (1776). pp. 200–201. With 2 text figs. [Central Military Hosp., Buenos Aires.]

The conclusion reached is that *Hymenolepis nana* of man and *H. nana* of the rat (*fraterna*) require for their evolution a secondary host, *Tenebrio molitor* or *T. obscurus*, and that these insects are infected as adults.

[These experiments show that *H. nana* may use an insect host. For evidence that development may proceed without one see this *Bulletin*, Vol. 21, p. 551—*bis*.]

C. L.

BACIGALUPO (J.). *Hymenolepis nana* Von Siebold, 1852 et *Hymenolepis fraterna* Stiles, 1906. [*H. nana* and *H. fraterna*.]—*C.R. Soc. Biol.* 1929. Vol. 102. No. 36. pp. 1102–1103. With 2 text figs.

Bacigalupo holds *H. nana* distinct from *H. fraterna* because, though the forms cannot be separated morphologically, *H. fraterna* produces cysts in 60 per cent. of *Tenebrio* species and *H. nana* in 10 to 16 per cent., and because when infection is direct *H. nana* has its cercocyst in the anterior portion of the intestine of the rat and *H. fraterna* in the posterior part.

C. L.

BACIGALUPO (Juan). El *Dermestes peruvianus* Castelnau en la transmisión del *Hymenolepis diminuta* (Rudolphi). [*Dermestes peruvianus* as a **Transmitter of *Hymenolepis diminuta*.**—*Semana Méd.* 1929. Aug. 22. Vol. 36. No. 34 (1858). pp. 559–560. With 2 text figs.

Dermestes peruvianus, a new intermediate host of *H. diminuta*, has been found infected in its larval stage both naturally and experimentally. The adult has not been found infected.

C. L.

KIPSCHIDSE (N.). Ein Fall von *Taenia flavopunctata*. [**Case of *T. flavopunctata* Infestation.**—*Arch. f. Schiff- u. Trop.-Hyg.* 1928. June. Vol. 32. No. 6. pp. 330–331. [Therap. Hosp. Clinic, State Univ., Tiflis, Georgia.]

Georgia (S.S.R.) appears to be a living helminthic museum. Hookworms infect 80 per cent. and other worms are varied and numerous. A man of 28 suffered from abdominal pain, epileptic fits, nausea, salivation and headache. Eosinophilia and the finding in the faeces of eggs of *T. flavopunctata* [*Hymenolepis diminuta*] led to the giving of male fern, passage of worms, and disappearance of eggs and all symptoms.

C. L.

FAUST (Ernest Carroll). **A Study of the Rare Human Tapeworm, *Taenia confusa*, with a Report of the Fourth Case.**—*Southern Med. J.* 1930. Oct. Vol. 23. No. 10. pp. 902–906. With 14 figs. [4 refs.]

——. **The Life Cycle of the Rare Human Tapeworm, *Taenia confusa* Ward, 1896.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Nov. Vol. 27. No. 2. pp. 94–95. [3 refs.] [Med. College, Tulane Univ., New Orleans.]

A worm passed after male fern differed from *T. saginata* in having an oval scolex, a pair of lateral elytra in the unsegmented neck, terminal proglottids longer and narrower, the uterine branches more clumped. Feeding of proglottids to a rabbit gave no infection, to a calf produced more than a thousand unarmed cysticerci considerably smaller than those of *T. saginata*. This is the fourth infection reported with *T. confusa*. It is held that this study shows adequate evidence for retaining *T. confusa* as a separate and distinct species of the *T. saginata* type; and that the few reports of its occurrence are explicable as isolated recognitions of a species which must be widespread, but unrecognized, in view of the few cases reported since WARD described it in 1896.

C. L.

CASTELLANO (Temistocles), ORGAZ (Jorge) & LUQUE (Fernando). Cisticercosis Bovis en el hombre? [**Cysticercus bovis in Man?**]—*Prensa Méd. Argentina.* 1928. Nov. 10. Vol. 15. No. 16. pp. 665–672. With 7 figs. [22 refs.]

A man of 53 who harboured *Taenia saginata* had about 50 subcutaneous nodules. One was excised and shown to be a cysticercus on whose scolex no hooks were detected.

C. L.

EISENKLAM (I.). Ein Bandwurm als Inhalt der Gallenblase. [**Tapeworm in the Gall Bladder.**]—*Wien. Klin. Woch.* 1929. Aug. 8. Vol. 42. No. 32. pp. 1051–1052. With 1 text fig. [4 refs.] [General Hosp., Vienna.]

Acute cholecystitis shown by tenderness and rigidity in the right hypochondrium of a woman of 64 with jaundice led to operation. From the gall bladder was removed a taenia 30 cm. long. The literature is reviewed.

WEBER (Fr. W. A.). Ueber Bandwurmkuren. [**The Treatment of Tapeworm Infestations.**]—*Muench. Med. Woch.* 1929. Aug. 9. Vol. 76. No. 32. pp. 1336–1338.

The paper deals essentially with treatment. That advised is in the evening 1 or 2 aperient tablets and three red coloured capsules of oxural, and next morning 20 capsules of taenural and one or two more aperient capsules. Oxural appears to be a proprietary preparation containing almost non-toxic oil of chenopodium [ascaridole, however, one must conclude is both the toxic and the actively anthelmintic material] and taenural a combination of *Filix mas* and chenopodium. The doses of the drugs themselves seem nowhere stated.

C. L.

MARGULIS (S.). Anwendung der Duodenalsonde zur Tānien austreibung bei Erwachsenen und Kindern. [**The Duodenal Tube in the Treatment of Taenia Infestation.**]—*Muench. Med. Woch.* 1929. Sept. 6. Vol. 76. No. 36. pp. 1510-1511. [4 refs.]

The duodenal sound is advised for the administration of male fern as giving better results with smaller doses than usual.

C. L.

FITZPATRICK (S. C.). **Hydatid of the Lung : an Analysis of a Series of Seventeen Cases.**—*Med. Jl. Australia.* 1929. Aug. 17. 16th Year. Vol. 2. No. 7. pp. 214-216.

A valuable clinical analysis difficult to abstract. Almost all small cysts were parabronchial or lay close to the hilum of the lung, but since all cysts tend in growth towards the periphery it is impossible to say exactly where the larger cysts arose. "Every patient with a ruptured cyst and 60 per cent. of those with unruptured cysts in this series had haemoptysis at some period," and in haemoptysis cases tubercle bacilli may be reported. In unruptured cysts thoracotomy, evacuation and drainage were carried out in one stage under general anaesthesia in those cysts which were basal and subpleural, with pleura generally adherent. If these conditions are not fulfilled surgery must wait on events. In deep cysts there remains the unsolved problem of how to influence the relations, biochemical and biophysical, between the cyst and the lung so that death of the cyst shall take place at an early stage. A number of questions are suggested for discussion.

C. L.

DÉVÉ (F.). Kyste hydatique et cancer. [**Hydatid and Cancer.**]—*Ann. Parasit. Humaine et Comparée.* 1930. July 1. Vol. 8. No. 3-4. pp. 437-449. [40 refs.] [Summary appears also in *Bulletin of Hygiene.*]

A paper of much interest and importance, not only as regards the question of the association and possible aetiological connexion between hydatid and cancer, but as illustrating the value of negative evidence. Cases of vesical carcinoma in urinary schistosomiasis, the association of gongylonema with cancer in mice, recorded instances of *Distoma felineum* and cancer of the liver in man and "precancerous" biliary fibroadenoma in sheep infested with *Fasciola hepatica* led the author to study the recorded cases of hydatid and cancer in man. Of these he has collected 31 cases between 1868 and 1927. With a single exception of sarcoma of the pancreas (reported by BRIGGS in 1890), about which there was some doubt, in every case the organ involved was the liver, and in all but seven the patient was over 60 years of age. Analysis showed that the association was not more frequent than might be accounted for by mere coincidence; also it is strange that though hydatids of lungs and other organs are not infrequent, no instances have been reported of malignant disease ascribed to the presence of the parasite, and, thirdly, though these cysts are far more common in domesticated animals their association with cancer has not been noted.

H. H. S.

ANDERSON (C. C.). **The Radiological Diagnosis of Hydatid Infection.**—*Brit. Jl. Radiology*. 1928. Nov. New Ser. Vol. 1. No. 11. pp. 428-434. With 6 figs. on 4 plates. [9 refs.]

The author's conclusions are as follows :

"Where there is sufficient contrast between the hydatid cyst and the surrounding tissues radiographic demonstration is a comparatively simple matter and the interpretation of the shadows obtained is not unduly difficult ; but as the densities approximate one another diagnosis becomes a matter of considerable difficulty, resting mainly upon the disturbance of normal contours of organs. Undoubtedly in cases of abdominal infection pneumo-peritoneum should be of assistance in outlining the cyst in such a manner as to facilitate demonstration and diagnosis.

"The chief diagnostic point is the demonstration of circular, ovoid or elliptical shadows in patients who have lived in sheep-country or who are fond of animals, especially dogs, and accustomed to make much of them."

The beautiful reproductions of X-ray plates show the substantial grounds on which the conclusions are based.

C. L.

CORKILL (Norman L.). **Hydatid Cyst of the Heart.** [Memoranda.]—*Brit. Med. Jl.* 1929. Oct. 5. p. 622.

A calcified cyst as large as a goose's egg, with wall 1 to 3 mm. thick, lay in the intraventricular septum and communicated through a small orifice with the left ventricle. The cyst contained antemortem clot. No cysts were found elsewhere. He died in his sleep, but was stated to have complained of "heart disease." No particulars of symptoms could be obtained. The body was that of an Iraqi from Baghdad.

C. L.

DÉVÉ (F.) & LESSERTISSEUR (M.). Kyste hydatique et diathermie. [**Hydatid Cyst and Diathermy.**]—*C.R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25. pp. 1061-1062. [3 refs.]

ARNONE* of Palermo having claimed success with diathermy in the treatment of hydatid cyst, the authors subjected two cysts to the process for 4 hours and 20 minutes. They were excised from liver and lung of sheep. They measured 4 and 5 cm. by 2.5 cm., and were left covered with 2 cm. of tissue, or where this was absent were clothed in cotton wool soaked in saline. A thermometer was placed between them and arranged to lie in the centre of the heating system. Temperature was maintained at 46° C., except that it fell to 39° C. during a 5 minutes stoppage each hour made in the interest of the apparatus. The scolices remained active at the end and infected a rabbit readily, though not quite so readily as those from an untreated cyst. Diathermy is, then, not curative.

C. L.

DÉVÉ (F.). Au sujet du processus histologique des géodes échinococciques périartérielles. [**Hydatid Periarterial Geodes.**]—*C.R. Soc. Biol.* 1929. Nov. 15. Vol. 102. No. 30. pp. 499-501. With 2 text figs. [3 refs.]

BACALOGLU *et al*† having thrown doubt on Dévé's statement‡ that a hydatid aneurism of the pulmonary artery in the lungs produced hydatid periarterial geodes or hard tumours with a central cavity, he reiterates his findings and conclusions and backs them with further microphotographs.

C. L.

* G. ARNONE. *La Cultura Medica Moderna*. Palermo. 15th April, 1928. p. 181.

† *Ann. de Méd.* 1929. Oct. Vol. 26. p. 242.

‡ *C.R. Soc. Biol.* 1927. Vol. 97. p. 552.

KELLAWAY (C. H.), FAIRLEY (N. Hamilton) & WILLIAMS (F. Eleanor). **The Filterability of Hydatid "Antigens."**—*Australian Jl. Experim. Biol. & Med. Sci.* 1928. Sept. 16. Vol. 5. Pt. 3. pp. 189-204. With 2 text figs. [10 refs.] [Walter & Eliza Hall Inst., Melbourne.]

The authors' conclusions are as follows. The methods of obtaining the membranes are described in the text.

"1. Ultra-filtrates from hydatid fluid in the pyroxylin membranes described (hardened in 50 per cent. and 60 per cent. alcohol) do not contain any antigenic substances detectable by complement fixation, anaphylactic or intradermal tests, nor do they give chemical reactions indicative of the presence of protein.

"2. With more permeable membranes (hardened in 70 per cent. and 80 per cent. alcohol) the ultra-filtrates obtained give positive Spiegler and haemochromogen reactions, react well in anaphylactic experiments, and give positive intradermal tests in patients infested with hydatid. They yield only feeble complement fixation reactions with positive hydatid sera.

"3. Though these last membranes do not permit the passage of protein when sheep serum is filtered through them, traces of sheep serum protein are shown to be present in ultra-filtrates from hydatid fluid."

C. L.

CANTANI (F.). Contribution expérimentale au diagnostic biologique des kystes hidatidiques dans l'homme. [**Biological Diagnosis of Hydatid Cyst in Man.**]—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1929. Aug. Vol. 1. No. 8. p. 195.

After examination of 21 cases, 4 of which came to autopsy, Cantani concludes that the best antigen is human hydatid fluid with nothing added and with no special treatment. With this he has obtained a positive result in 20. The diagnostic technique he places highest is that of Ghédini Wemberg which depends on deviation of complement.

C. L.

MORENAS (L.). A propos de la spécificité de la réaction de Casoni (intradermo-réaction hydatique). [**The Specificity of Casoni's Reaction.**]—*C.R. Soc. Biol.* 1929. Dec. 6. Vol. 102. No. 33. pp. 786-787.

A positive Casoni reaction was obtained in 2 cases. In the first there was a hydatid cyst on the under surface of the liver; two months after its removal by operation the reaction was negative. In the second, intervention showed that a suspected enlarged spleen was caused by Banti's disease, and the reaction is attributed to a *T. saginata* which, it was found, he harboured. Mention of a possible undetected hydatid is not made.

C. L.

CUBONI (Ettore). Intradermoreazione con liquido echinococcico in animali trattati con antigene echinococcico. [**Intradermal Reaction with Hydatid Fluid in Animals treated with Echinococcus Antigen.**]—*Bol. Istituto Sieroterap. Milanese.* 1929. Aug.-Sept. Vol. 8. Nos. 8 & 9. pp. 519-527. [7 refs.] German summary pp. 527-528.

The Casoni reaction, obtained by injecting 0.1 cc. of hydatid fluid into the dermis, was evident in guineapigs and rabbits after they had been sensitized by the injection of hydatid fluid subcutaneously or intraperitoneally.

C. L.

MOLLOV (W.). Ueber die Beeinflussung der biologischen Reaktionen nach Anstellen der Casonischen Reaktion bei der Echinokokkenkrankheit des Menschen. [Biological Effects of Casoni's Reaction for Hydatid Infection.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Apr. Vol. 32. No. 4. pp. 187–194. [18 refs.] [Intern. Clinic, Univ., Sofia.]

It was found that the Casoni reaction might be followed by an eosinophilia; while in two cases it apparently provoked a positive Weinberg reaction. The cases detailed number six.

C. L.

- i. STOLL (Norman R.). **On Methods of counting Nematode Ova in Sheep Dung.**—*Parasitology*. 1930. Jan. Vol. 22. No. 1. pp. 116–136. With 1 plate & 1 text fig. [16 refs.]
- ii. ——. **Studies with the Strongyloid Nematode, *Haemonchus contortus*. I. Acquired Resistance of Hosts under Natural Reinfection Conditions Out-of-Doors.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 384–418. With 6 figs. [50 refs.] [Rockefeller Inst. for Med. Research, Princeton, New Jersey.]

i. Stoll has compared the collections of ova of *Haemonchus contortus* from sheep's dung by D.C.F. and by his dilution method. Regarding the former he points out that a failure to find ova predominantly in the preparation made after the first centrifuging in salt solution may be due to a drop of water remaining at the top of the tube after the precipitation of the watery faecal suspension and the pouring away of the supernatant fluid. This water dilutes the upper layer and prevents the eggs from rising into it. Stoll used 0.5 gm. of faeces and found that it produced at the bottom of the tube a mass of debris 2 cm. high and so compact that the complete upending of the tube was possible without disturbing it. Moreover, there were practically no eggs in the pour-off, while the first cover brought away 87.3 per cent. and the second 11 per cent. of all eggs recovered. D.C.F. collected only 90 per cent. of the eggs recovered by Stoll's own method. He reproduces figures of eggs in which the egg contents are expressed from the shells during D.C.F.

[Stoll has evidently not closely studied the description of D.C.F. which he quotes, for he has inadvertently altered it in essential particulars. He has omitted the use of a disintegrator in the salt solution and has not corked and upended the tube to mix its contents completely. Both are essential for certain success and their omission is enough to cause inaccuracy. Moreover, in transferring D.C.F. to sheep dung Stoll has used an amount which produces a deposit ten to twenty times as great as 1 cc. of human faeces gives. With so much material passing downwards at the same time as eggs are passing upwards during centrifuging, it would be surprising were an essential percentage of eggs not entangled and carried down. That D.C.F. imperfectly executed was not at its best in sheep dung should not discourage its use properly effected in the human faeces for which it was devised. That eggs should burst is, as already pointed out, contrary to physical laws and has never occurred in the many tens of thousands of eggs seen by the abstractor.]

ii. While Stoll used his own technique for counting heavy infections, he fell back on D.C.F. for all infections below 1,000 eggs per gram. Of two clean segregated lambs, one was deliberately infected with 45 *haemonchus* larvae grown from the eggs of one worm; and all later infections in both lambs were from the progeny of these larvae, for the two animals were set to graze on restricted areas of clean pasture which

could be infected only by themselves. Faecal egg output reached its peak about two months after initial infection, and then rapidly fell, so that 4 to 6 weeks later eggs were not always found, "indicating that the egg flow was spasmodic at so low a concentration as to prevent their regular demonstration *even** by D.C.F." Nor did massive feeding of larvae to one lamb increase the degree of infection. D.C.F. was found superior to Baermann's extraction method in the recovery from sheep's dung of larvae which had been fed to the animal, yet [not unexpectedly] only a small percentage of those administered were recovered from the dung. The general results are best explained by the acquisition of a marked immunity to the infection. About a year after the beginning of the experiment dogs got into the flock and killed both animals. The egg contents per gram of faeces removed from the rectum after death were 70 and 1, while the worms recovered from the stomach were 55 and 27 respectively. [While the worms varied as 2 to 1, the eggs varied as 70 to 1. There was, then, no correlation between these egg counts and these worm counts.]

C. L.

SPINDLER (L. A.). **The Relation of Moisture to the Distribution of Human Trichuris and Ascaris.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 476-496. With 2 text figs. [37 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Field studies were made in West Virginia and three areas were selected for special comment. In Darkey Town with shaded yards the percentage incidence of trichuris was 61 and of ascaris 56. In Pagetown the incidence of both infections was 85, and the ground round the houses exposed, dry and hard; but under the houses it was shaded and damp, and there the children defaecate. In Pardee trichuris infection was 20 per cent. and ascaris 58, and the soil in the yards dry and hard; the presence of possible under-house infection is unnoted. Live embryonated trichuris eggs were found seldom in soil from unshaded places, but frequently in that from damp shaded spots. Soil moisture is then held to be the principal factor in the development of trichuris eggs to maturity and literature is cited supporting this conclusion.

Experiments were made on faeces kept in a 5 per cent. formaldehyde solution in an ice box till used, the eggs being then recovered by centrifugal floatation in saturated salt solution and placed on coverslips to dry. From some dried slips eggs were washed into water and incubated at 22° C. and 30° C. as controls; they developed satisfactorily. Other slips were placed in incubators at 22° C. and 30° C., and at 77 per cent. saturation and 100 per cent. saturation with moisture. At 22° C. and 77 moisture, all trichuris eggs were dead on 11th and 12th days, ascaris eggs being alive on the sixteenth day. At 22° C. in saturated air, 98 per cent. of trichuris eggs were dead on the 19th day, and again 96 on the 12th day, though 39 per cent. of ascaris eggs were embryonated the sixteenth day. At 77 saturation and 30° C. all trichuris eggs were dead on the 16th day; ascaris flourished. It is concluded that the moisture requirements of trichuris eggs are higher than those of ascaris [a conclusion which seems to involve the assumption that the preliminary treatment affects both species equally.]

C. L.

* Italics not in original.

AVINÉE (E.) & TIPREZ (J.). Sur la régularité des pontes de l'*Ascaris* et du trichocéphale dans les fèces. [**The Regularity of Egg-laying by *Ascaris* and *Trichuris*.**—*C.R. Soc. Biol.* 1929. Vol. 102. No. 36. pp. 1030-1031. [2 refs.]

The authors used a technique, which they will subsequently describe and which, they state, produces a stable suspension of faeces. With it they examined 31 infected persons for ascaris and trichuris. There were no periods in which eggs were intermittently absent; there were variations in their number, but these were trifling. They conclude regarding these parasites that the fear that negative examinations may occur in parasitized men are groundless.

C. L.

RANIERI (Gustavo). Sindromi rare di parassitosi intestinale. II. Nota. Pseudo occlusione intestinale spastica da elmintiasi (ascaridi e ossiuridi). [**Rare Syndromes in Intestinal Parasitism. II. Enterospasm in Helminthiasis (*Ascaris* and *Oxyuris*).**—*Riforma Med.* 1930. June 2. Vol. 46. No. 22. pp. 839-840. [Inst. of Clin. & Med. Path., Univ., Messina.]

A boy of 15 years sent to hospital for immediate operation for acute intestinal obstruction. Many of the symptoms of "acute abdomen" were present, but the facies was not typical, temperature was not subnormal, and the general condition was good. An enema was given and ova of *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Trichuris trichiura* were seen in large numbers. Treatment with santonin, calomel and a purgative resulted in cure.

H. H. S.

CORT (W. W.), OTTO (G. F.) & SPINDLER (L. A.). **Investigations on *Ascaris lumbricoides* and the Associated Intestinal Helminths of Man in Southwestern Virginia.**—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 1-55. With 1 map, 1 graph & 9 text figs. [16 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Some of the results of an investigation in southwest Virginia have been reported separately by Spindler and Otto. Others are here described. Of children 50 per cent. and of adults 30 per cent. were found infected and nearly all heavy infections were in children. The infection ran in families, and the surfaces of house yards of infected families were studded with pollution rich with ascaris eggs, because the youngest children did not use the privies which were always present. Where children were under control and made to use these, infection was at least exceptional. There was no evidence that the water supply contributed to carry infection, nor that "the general environmental conditions, amount of vegetation or the character of the soil influenced ascaris infestation except in those places where unshaded yards were covered with a layer of cinders." The trichuris condition has been noted in the other papers. Hookworm infection was present in 6.1 per cent. of cases, and few only were seriously affected. The diagnostic technique was Stoll's small drop, stools were "corrected" for consistency, and over 2,000 persons examined.

C. L.

LEITCH (J. Neil). **Ascariasis.**—*Jl. Trop. Med. & Hyg.* 1929. Dec. 2. Vol. 32. No. 23. pp. 340-342.

A general survey of ascariasis is made from the clinical side. Some special points are as follows. On four occasions during the invasion stage Leitch has found larvae in the sputum. In addition to this, the signs of this stage are put as an atypical pneumonia, lobular rather than lobar, with blood-stained sputum and a temperature lower than is common with a bacterial infection. Rigors and septicaemia occurring later are attributed to secondary bacterial invasion. Death may follow cerebral, obstructive, or inflammatory complications. For treatment is advised santonin or a mixture of carbon tetrachloride and oil of chenopodium. Under prevention it is suggested that "ascaris embryos probably vie with their hookworm cousins in rising through remarkable depths of soil from buried faeces, while, unlike these, they can 'bide their time' in their thick eggshell."

C. L.

MORETTI (Giulio). Alcune osservazioni sulla diffusione quantità e persistenza nell' intestino delle uova di "Ascaris lumbricoides Linn." commiste a feci. [**Diffusion, Quantity and Persistence of Ascaris Ova.**].—*Riforma Med.* 1928. Sept. 10. Vol. 14. No. 37. pp. 1194, 1197, 1198. [26 refs.] [Bergamo Hosp., Bergamo.]

Moretti holds that for ascaris the simple smear gives as certain a diagnosis as the concentrative methods which he has tested; and in most cases eggs were found in the first smear if they were found at all. In 111 children examined, ascaris was found in one only, but from 3 to 10 years of age the incidence was uniform at all ages. There was some evidence of a familial incidence. Egg counts checked against the mean weight of faecal output in one child put the daily egg output of the female ascaris as 107,000.

C. L.

OTTO (G. F.). **A Study of the Moisture Requirements of the Eggs of the Horse, the Dog, Human and Pig Ascarids.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 497-520. With 2 graphs. [25 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Faeces were placed on the surface of four "soils"—clay, sand, loam, and a mixture of cinders and loam. [Whether "soil" means the humus overlying such subsoils, as it would in England, or the subsoil itself, as it often seems to do in America, is uncertain.] The elected sites lay either in sun or shade. They were exposed to the ravages of and, in the sun especially, were rapidly destroyed by dung-eating insects. Samples from a polluted area were examined for ova by the Caldwell's method, the eggs recovered being classed as: alive and embryonated, alive and non-embryonated, dead. Tables show the percentages of each class to the total count of the specimen, without correlation to the number originally present. Samples, it is pointed out, may be "unrepresentative," since a small lump of faeces may be examined in one and earth without faeces in another. Thus 3 samples from an unshaded site on loam, taken at intervals over a month, averaged 31 per cent. of live embryonated eggs; the next sample showed none alive, the next 29 per cent. alive. The mortality percentage as thus defined was bigger

and set in earlier in sun than shade. Eggs taken from the last portion of the uterus of the worm were cultured in incubators placed on sand, either dry or set in water and with an overlying atmosphere of known but varied saturation, and on glass slides or covers in the same conditions. Those in a heavily impregnated atmosphere did far better than others. It was found that the degree of saturation in the atmosphere necessary to produce development to embryonation was 80, that as the temperature rose from 22° C. to 30° C. the moisture requirement of the egg increased, and that the relative soil moisture did not affect the suitability of these soils for culturing ascaris eggs. [In cultures in a saturated atmosphere condensation as patent water is probably invariable on any surface. In these experiments the eggs were all on the surface.]

C. L.

SPINDLER (L. A.). **On the Use of a Method for the Isolation of Ascaris Eggs from Soil.**—*Amer. J. Hyg.* 1929. July. Vol. 10. No. 1. pp. 157-164. [3 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The procedure, already mentioned (this *Bulletin*, Vol. 26, p. 985), may now be given in detail. By sweeping or light scraping over a wide area there is collected at least a pint of soil. After powdering and mixing, a 5 gm. to 10 gm. sample is added to 10 cc. of a 30 per cent. antiformin solution with frequent stirring. The antiformin must act on every particle of soil; otherwise, it is stated, many eggs will remain adhering to the soil particles and will not be recovered in the subsequent centrifugal floatation (at 1,000 revolutions a minute for one or two minutes) in sodium bichromate solution of 1.35 s.g. Striking results of soil infection are noted when there was no evidence that faeces were being deposited, and it is believed that they will prove of quantitative value; but it seems admitted that not all eggs are recovered. Perhaps another observation partly explains this. It is said, "The number of embryonated eggs recovered in isolations was surprisingly small. Theoretically as the soil of an area is constantly polluted and the eggs go on developing, there should be a piling up of enormous numbers of embryonated eggs." [A fair comment seems to be that since embryonated hookworm eggs do not float with the certainty with which do those in the earlier stages, it needs investigation as to whether embryonated ascaris eggs do not suffer from the same disability. If so, the proportion of embryonated eggs recovered by floatation will prove no measure of the proportion present in the earth.]

C. L.

KHAW (O. K.). Untersuchungen ueber Hautreaktionen bei Impfung mit Ascaristrockensubstanz. [**Skin Reactions in Inoculation with Dried Ascarides.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Jan. Vol. 33. No. 1. pp. 46-50. [6 refs.]

Experiments were made on 99 school children and 37 Buddhist monks. The conclusion falls in with that of others, namely, that the skin reaction is not of value in the detection of ascaris infection, since it may be positive when no eggs are discovered and negative when they are. In Amoy trichuris eggs were found in half the cases, ascaris occupied the second place, hookworm eggs were seldom detected and clinical

ankylostomiasis was not met with. Diagnosis was by three smears of unstated size and three covers obtained by FÜLLEBORN'S gravity floatation method.

C. L.

JADASSOHN (Werner). Allergiestudien bei der Ascaridenidiosynkrasie. [**Study of Allergy in Idiosyncrasy to Ascaris Infestation.**]—*Arch. f. Dermat. u. Syph.* 1928. Nov. 9. Vol. 156. No. 3. pp. 690–745. With 55 text figs. [68 refs.] [*Dermat. Clinic, Zurich.*]

This very extensive and important study of the reaction of the skin to extracts of *Ascaris* not only confirms and reviews many of the previous findings on this subject, but gives the results of many experiments performed by the author and some new and important conclusions. He is concerned with the immediate type of reaction and he points out that it is well known that asthma, hay-fever-like symptoms and urticaria are provoked by contact with ascaris antigens. These symptoms can be provoked by minute quantities and are associated not only with ascaris infections, but with the presence of ascaris in the environment; e.g., a laboratory worker or a slaughter-house worker may become sensitized without ever having harboured the helminth. He finds that an immediate reaction follows the injection of an ascaris antigen in 80 per cent. of persons between 2 and 40 years of age; but that children under one year old never react, and the effect is less frequent in old persons. A definite relationship between ascaris infection and the cutaneous reaction could not always be demonstrated, however, while a previous infection does not exclude a negative reaction.

The antigen was thermostabile, but becomes deprived of its effect after boiling with 10 per cent. hydrochloric acid. It is not affected by 0.5 per cent. phenol, lengthy autolysis, peptic or tryptic digestion. It is dialysable, i.e., it is *not* albuminoid.

The author repeated the work of PRAUSNITZ and KÜSTNER and finds that their antibody keeps its activity for a week in an ice box, is not impaired by 0.5 per cent. phenol or 5.0 per cent. chloroform (if the latter is removed *in vacuo*), is fairly resistant to peptic and tryptic digestion, is not found in the dialysate, but has its activity lowered by heating to 56° for one hour and destroyed after six hours. In serum with a high sensitivity to ascaris there is no precipitin. He found also that the Prausnitz-Küstner experiment was successful with citrated blood instead of serum and that the antibody sensitizes the skin against antigen from either horse or human ascarids.

In vitro experiments showed that the power of the antigen could be destroyed by mixture with the antibody and *vice versa*; i.e., the antibody and the antigen appear to neutralize each other, and the mixture becomes inoperative. This occurs only after the lapse of an hour at room temperature, and the neutralization is not affected by warming to 56° for six hours or by acidifying the mixture. He considers that this antigen-antibody reaction is never a complete one, but that, in addition to the neutralized substance in the mixture, both original substances are present in solution. This neutralization phenomenon can also be demonstrated on skins which are primarily susceptible or are rendered so by injection of the Prausnitz-Küstner antibody, provided that the test areas are neither too large nor too small.

[There are two main types of cutaneous tests: the first depends on hypersensitiveness to specific materials (e.g., hay fever), while the

second depends on the injury caused by a definite toxin in the absence of its antibody. In ascaris infection the reaction is of the first type and there is an immediate reaction almost at once after injection of the antigen as well as a delayed reaction some hours later. It is with the first of these reactions that the present paper is concerned. The immediate reaction may be demonstrated after scarification or by intradermal injection of the antigen. **PR AUSNITZ and KÜSTNER** (*Zent. f. Bakt.*, 1921, Vol. 86, pp. 160-169) demonstrated that the intradermal injection of serum taken from an ascaris sensitive subject could cause a local temporary passive sensitization in a non-sensitive patient.]

Thomas W. M. Cameron.

HEGGLIN (Otto). Zur Verbreitung und klinischen Bedeutung der Askari-denallergie. [**Distribution and Clinical Significance of Allergy in Ascariasis.**—*Schweiz. Med. Woch.* 1929. Jan 5. No. 1. pp. 11-14. With 2 text figs. [10 refs.] [*Dermat. Clinic, Univ., Zurich.*]

Hegglin, as the result of over 400 experiments, confirms the conclusions of others, that ascaris infection and skin sensitiveness to ascaris toxin do not run parallel.

C. L.

LAMSON (Paul D.), **WARD** (Charlotte B.) & **BROWN** (Harold W.). **An Effective Ascaricide—Hexylresorcinol.**—*Proc. Soc. Experim. Biol. & Med.* 1930. June. Vol. 27. No. 9. pp. 1017-1020. [5 refs.] [*Med. School, Vanderbilt Univ., Nashville, Tenn.*]

Hexylresorcinol is the most promising drug which several years' search in the authors' laboratory for a non-toxic ascaricide has so far revealed. It is a white waxy crystalline substance, melting at 59°-61° C., slightly soluble in water or mineral oil, readily soluble in alcohol, glycerine and vegetable oils. "It has been shown by Veader Leonard to have an extraordinarily high bactericidal action and to be the least toxic of a large series of substituted resorcinols which he has studied. It has been given as the pure crystals in gelatin capsules by mouth in doses varying from 0.1 to 1.0 gm. 3 times a day for as much as 10 weeks without deleterious effect, and to many hundreds of patients in olive oil under the name of caprokol (N.N.R.) as a urinary antiseptic." It has proved, it is reported, of marked anthelmintic value against ascaris of dog, pig and man. The evidence is to be given later. It produces burning in mouth and stomach, and in dogs reddening of the gastric mucosa, submucous haemorrhage and even epithelial necrosis, the irritant action being increased by alcohol.

C. L.

VILLIGER (E.). Beitrag zu den chirurgischen Komplikationen bei Askari-den. (Ileus bei einem mit Askariden vollgepfropften Meckel'schen Divertikel.) [**Surgical Complications in Ascariasis.**—*Schweiz. Med. Woch.* 1929. Sept. 7. No. 36. pp. 909-910. With 1 text fig. [*Canton Hosp., Aarau.*]

In the abdomen of a child of ten, opened for appendicitis, there was found 50 cm. above the caecum a Meckel's diverticulum with paper-thin walls, through which, as white streaks and prominences, could be seen ascarids. The diverticulum was removed and contained 64 ascaris which had caused diverticulitis.

C. L.

SINICCO (Silvestro). *Ascaridiosi intestinale in bambino di undici mesi—Infestazione dei dotti pancreatici e delle vie biliari extra e intraepatiche—Ascessi multipli del fegato—Cirrosi del fegato e del pancreas. [Complications of Ascariasis in Child of 11 Months.]—Arch. Ital. Sci. Med. Colon.* 1927. Dec. Vol. 8. No. 12. pp. 701-711. With 5 figs. on 3 plates. [21 refs.]

The child was passing ascarids by mouth and anus. The mother feared it would be suffocated. After an anthelmintic this emission continued. Death was from broncho-pneumonia. The title shows the lesions found. There were 300 ascarids in the duodenum, and numbers in the bile passages and in cavities in the liver where some lay just under the peritoneum.

C. L.

O'BRIEN (Henry R.). *Ascaris in the Appendix.*—*China Med. Jl.* 1929. Nov. Vol. 43. No. 11. p. 1144. [McCormick Hosp., Chiangmai, Siam.]

Two or 3 weeks after intermittent pain in the right lower abdominal quadrant, a girl of 18, who had hookworm and ascaris eggs in the faeces, was given 0.67 cc. of oil of chenopodium and operated on next day. An ascaris filled the appendix, half its length lying in the caecum. It could not be "milked" back into the caecum, but on opening the tip of the appendix it crawled out. It is believed that it took refuge in the appendix only after the taking of chenopodium, on the ground that a prolonged residence in the appendix should have set up more peritonitis than was found at operation.

C. L.

HENRIQUES (J. F.). *Ascariasis simulating Abdominal Tumours.*—*Indian Med. Gaz.* 1929. Oct. Vol. 64. No. 10. p. 571.

There were 4 or 5 masses in the abdomen of a child of 5. The condition was said to have been present for 2 months. Salol given as a *placebo* in the belief that the tumours were malignant removed the tumours and expelled 25 worms. Santonin expelled a few more.

C. L.

STEKHOVEN (J. H. Schuurmans), Jr. *Researches on Nemas and their Larvae, III. Strongyloides stercoralis Bavay.*—*Ztschr. f. Parasitenk.* Berlin. 1928. Aug. 10. Vol. 1. No. 2. pp. 231-261. With 37 text figs. [45 refs.] [Zool. Lab., Reich Univ., Utrecht.]

This paper contains a critical summary of certain literature on *S. stercoralis* together with the author's observations. His attention was called to the subject by a slide containing scraps of the mucosa removed by a duodenal tube. The cells of the crypts "enclosed" larvated eggs; their recovery by duodenal tube, it is noted, has already been recorded. Filariform larvae and the free living adults are closely described. The first he believes has three lips, 4 submedian papillae, and the openings of an amphid at each side. As regards the forces producing adult forms, he holds that conditions are complicated and further cytological studies needed. Regarding autoinfection he cites a case of passage of old, hard faecal pellets after chenopodium and a purgative. The stool contained just-hatched and still-coiled larvae, rhabditiform larvae and filariform larvae. The host had been out of the tropics for "a long

period." The paper by FÜLLEBORN (this *Bulletin*, Vol. 24, p 528) with its evidence for autoinfection is not mentioned. As regards persistence in cultures, "according to these experiments the longevity does not exceed 3 to 4 weeks under favourable conditions of humidity and temperature." [The cultures were not, however, trapped and elsewhere Stekhoven notes how marked is the disposition of filariform larvae to form collections on prominent points of the culture; that is to say, they show an instinct which will carry them out of cultures in proportion as they are lively and so presumably long lived. Those remaining in cultures are therefore presumably the weaklings, those least likely to survive.]

C. L.

OPHÜLS (W.). **A Fatal Case of Strongyloidosis in Man, with Autopsy. The Life Cycle of *Strongyloides intestinalis* in Man.**—*Arch. Pathology*. 1929. July. Vol. 8. No. 1. pp. 1-8. [19 refs.] [Med. School, Stanford Univ., San Francisco.]

An acute streptococcal stomatitis, vomiting and diarrhoea with circumanal excoriation, weakness, collapse, and death occurred in a railway engineer of 36 who had lived all his life in Texas except the last six months in California. Autopsy within a few hours of death disclosed a gastritis, the mucous membrane of the pyloric region showing "mother worms," ova and rhabditiform embryos. The mucosa of the colon showed a considerable number of filariform larvae, the submucosa and muscular coat a few, while some were also found in the swollen lower mesenteric lymph nodes. Presumably, then, there was occurring the development within the body of infective larvae and reinfection by larvae which never left the anus, an extracorporeal stage being completely cut out.

C. L.

STÄHELIN (Adolf). Studien ueber den Mechanismus der Trichinelleninfektion. I. Mitteilung. [**Mechanism of Trichinella Infection.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Dec. 20. Vol. 105. No. 1/3. pp. 114-133. [10 refs.] [Hyg. Inst., Univ., Basel.]

The mechanism of infection is viewed as occurring in two stages: entry into striped muscle and development therein. The young larvae do not enter isolated fragments of muscle which have been transplanted into peritoneum, subcutaneous tissue, or other muscle; but they do enter and develop in paralysed muscle, and, if expressed from muscle while quite young and injected into the carotid artery or into striped muscle, they will develop and encyst in muscle; but if muscle containing young larvae is transplanted, they do not migrate out of it. Larvae encysted in a piece of muscle finally die if that is transplanted into other muscle, but if the animal is of the same species (guineapig to guineapig) they remain alive and infective for more than forty days, whereas if it is of another species (rabbit to guineapig) all are incapable of infection in 15 days; if the transplanted muscle contains young instead of encysted larvae their death is very rapid even when the animals are of the same species. Infection is not produced by feeding either with intestinal trichinella or with unencysted larvae which have reached muscle.

C. L.

DOERR (R.) & SCHMIDT (G. W.). Studien ueber den Mechanismus der Trichinelleninfektion. VI. Die Besiedelungsdichte der quergestreiften Muskeln und ihre Abhängigkeit von der Art der Einschaltung der Trichinenembryonen in den Blutkreislauf. [**Studies of Trichinella Infection. VI. The Density of Deposition in Striated Muscle and its Relation to the Mode of Entrance of the Embryos into the Circulation.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. July 30. Vol. 113. No. 3/4. pp. 271–277. [Hyg. Inst., Univ., Basel.]

If female embryo-containing trichinellae are injected into the venous circulation the development of measles is greater in the masseters than in the diaphragm or muscles of the extremities, the degree of infection in these being in decreasing order as follows: diaphragm, anterior limb, posterior limb. If a common carotid be tied the amount of infection in the muscles supplied by it is lessened. If injection be made into an artery there is a generalized infection, but the muscles supplied by that artery are those most affected.

C. L.

WEINDRACH (G.). Das Blutbild und die Eosinophilie bei Trichinose. [**The Blood-Picture and Eosinophilia in Trichiniasis.**]—*Folia Haematologica.* 1929. July. Vol. 38. No. 3/4. pp. 380–384. [7 refs.] [Soviet Hosp., Odessa, & Bact. Inst., Viatka.]

Weindrach reports 3 cases of trichinosis which were followed up for 3 years and 7 months. There was a primary leucocytosis with an eosinophilia in the neighbourhood of 50 per cent. The former was not persistent, the latter did not reach normal in two of the three cases within the period of observation. Red corpuscles neared or exceeded 6,000,000 about the end of the first month, and then fell to or below normal.

C. L.

BACHMAN (George W.). **A Precipitin Test in Experimental Trichiniasis. Second Report.**—*Jl. Preventive Med.* 1929. Nov. Vol. 3. No. 6. pp. 465–469. [2 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.] [Summary appears also in *Bulletin of Hygiene.*]

Continuing his work with *Trichinella* [see this *Bulletin*, Vol. 25, p. 470], Bachman prepared an antigen, as before from larvae separated from infected meat by artificial digestion, dried and pulverized, but suspended in Coca's solution (NaCl, 0·7 per cent.; NaHCO₃, 0·05 per cent.; and phenol, 0·4 per cent.) for 24 hours or longer at room temperature. He finds that precipitin antibodies can be detected 5 to 20 days after infection, i.e., during the period of ingress, when the adults are present in the small intestine and before larvae have entered the blood stream. His previous antigen, extracted with 0·01/N hydrochloric acid in normal saline, did not detect the parasites before the 20th day after infection.

T. W. M. Cameron.

BACHMAN (George W.) & MENENDEZ (Paris E.). **Complement Fixation in Experimental Trichiniasis.**—*Jl. Preventive Med.* 1929. Nov. Vol. 3. No. 6. pp. 471-473. [5 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.] [Summary appears also in *Bulletin of Hygiene.*]

Bachman and Menendez have used as antigen dried larvae extracted with Coca's solution. The sera of eight rabbits were tested and the titres rose on the 3rd day after infection, dropped from the 15th to the 20th day, and rose rapidly again to the 35th day. Owing, however, to the great variability in titre and the non-specific reaction of the serum of the rabbits, the authors doubt if the method is of any practical value before the 25th day after infection.

T. W. M. Cameron.

CALDWELL (Fred C.) & CALDWELL (Elfreda L.). **A Study of the Anthelmintic Efficiency of Higerolates in the Treatment of Trichuriasis, with Comment as to its Effectiveness against Ascaris Infestation.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 471-482. [14 refs.] [Field Research Lab., Internat. Health Division Rockefeller Foundation, Andalusia, Alabama.]

A survey of the literature shows that trichuris is not to be taken as a harmless commensal and that it is not readily removed. In this investigation a preliminary study of 9 cases suggested that higerolates, held to be the latex of *Ficus laurifolia*, was an efficient vermifuge for trichuris, one patient indeed passing a ball of 1,956 living worms, 900 males and 1,056 females. Accordingly a series of 117 trichurias infections was treated with 60 cc. of the latex mixed with 2 ounces of milk, and the same number with 1.5 cc. of oil of chenopodium [of unstated ascaridole content] in two halves given in hard gelatin capsules. The fact of infection was established by "the salt flotation method" [of which there are a number of varying accuracy], and the amount of infection by egg counts by the authors' antiformin method on stools sent to a central laboratory and there kept on ice. Worm counts are held exceedingly laborious, often inaccurate and almost impossible on a large scale. After latex the percentage of egg reduction was 85.4 and the cures, presumably to "the salt flotation method," 53.8, the corresponding figures after oil of chenopodium being 17.0 and 1.7. As regards ascaris the two treatments proved about equally effective, allowing for the degree of accuracy of the diagnostic methods used.

C. L.

ROBBINS (Benjamin H.). **A Proteolytic Enzyme in Ficin, the Anthelmintic Principle of Leche de Higueron.**—Reprinted from *Jl. Biol. Chem.* 1930. June. Vol. 87. No. 2. pp. 251-257. With 1 text fig. [7 refs.] [Med. School, Vanderbilt Univ., Nashville.]

Robbins obtained from CALDWELL a quantity of Leche de Higueron. Whether it is derived from *Ficus laurifolia* or *F. glabrata* he considers uncertain. The crude sap is a yellow-white syrup containing 25 per cent. by weight of protein. He set out to determine its active constituent. Suspended matter so far as it precipitates on centrifuging

is inactive. By treating the fluid portion with 3 parts of acetone a waxy mass is formed; on dissolving this in water, reprecipitating, washing with acetone, and drying in a vacuum with calcium chloride, a light yellowish powder is obtained—about 12 gm. from 100 cc. of sap. It is named ficin and gives the protein reactions. The ascaricidal properties described are most remarkable. H. W. BROWN in a personal communication informs Robbins that ascarids remain without evident change in Ringer's solution for a fortnight; but fresh living ascarids from the pig placed in a 0.1 or 0.2 per cent. solution of ficin in Ringer's fluid at body temperature become within an hour flaccid and wrinkled and generally have slight blister-like lesions anteriorly. Half an hour later these have become ulcers, 3 by 1 mm., all over the body and almost perforating the body wall. Within two hours perforation has occurred and the viscera protrude through the openings. Nevertheless the worms still move. They actually become dissolved alive. Ficin heated to 75° C. is rendered permanently inactive; with a pH between 4 and 9 it is active; with one between 2 and 3 it is not, and neutralization does not restore activity; it readily hydrolyses coagulated egg albumen and casein; it forms leucin and tyrosin. Ficin then acts as a proteolytic ferment of the trypsin type having a specific action on ascaris. "Ficin was found to digest hookworm, but less readily than ascaris and had no effect on the spiny headed worm [echinorrhynchus?] which is found living with ascaris in the pig's intestine." It is pointed out that the large 60 cc. dose used by the Caldwells [which would furnish 60 litres of an active ascaris-dissolving fluid] is presumably necessary because of the destruction of ficin in the stomach. [Doubtless its administration in capsules dissolving in the intestine only will be undertaken.]

C. L.

PIROT & BARRAT. *Hepaticola hepatica*, Hall 1916, parasite du rat à Saïgon. Existe-t-il sur les rats de bord en Extrême-Orient? [*Is H. hepatica found in Ship Rats in the Far East?*]—*Arch. Méd. et Pharm. Nav.* 1929. Apr.-May-June. Vol. 119. No. 2. pp. 277-283. [5 refs.]

An interrupted research showed frequently the eggs of *Hepaticola hepatica* in the livers of rats (*Mus decumanus*) in Saïgon. The eggs from ground-up liver developed at 28° C. to 31° C. in neutralized animal charcoal to the embryo stage.

C. L.

ZAWADOWSKY (M. M.) & SCHALIMOV (L. G.). Die Eier von *Oxyuris vermicularis* und ihre Entwicklungsbedingungen, sowie ueber die Bedingungen, unter denen eine Autoinfektion bei Oxyuriasis unmöglich ist. [*The Developmental Needs of Ova of Oxyuris vermicularis and the Restrictions which make Autoinfection in Oxyuriasis Impossible.*]—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 12-43. With 17 text figs. [24 refs.] [Inst. General Biol., IInd State Univ., & Lab. Exper. Biol., Zoological Gardens, Moscow.]

It is concluded from the experiments made that the eggs of threadworms will develop further after leaving the body only if they have already reached the tadpole stage. If they have done so they will

develop in normal saline, in water, in saturated copper sulphate solution, in formalin and other media. Female worms found in the appendix are unfertile. Development occurs between 20° and 40° C. ; oxygen must be present, but it is held that in the rectum the worms might obtain this by sucking blood. The shell is held to consist of four membranes. The innermost is soluble in alcohol, ether, chloroform and acetic acid, and is held to be clearly lipoid and a protection against chemical substances, whilst the other three form a mechanical defence ; the means by which they are severally identified are not easy to follow. The italicized conclusion is that since threadworm eggs cannot develop beyond the tadpole stage without oxygen and since this is absent in the gut autoinfection is impossible. [Apparently, then, the author's suggestion that the worms possibly obtain oxygen by blood-sucking is not seriously entertained.]

C. L.

CAMERON (T. W. M.). **The Species of *Enterobius* Leach, in Primates.**—*Jl. Helminthology*. 1929. July. Vol. 7. No. 3. pp. 161–182. With 28 text figs. [9 refs.]

Cameron describes 12 species of *Enterobius* from Primates to which order the genus is limited. He points out that the life history of the members of the genus tends to make them parasites of the individual.

C. L.

OLEINIKOW (S. V.). Sur le diagnostic et l'épidémiologie dans l'enterobiose. [**Diagnosis and Epidemiology of Enterobiosis.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 6. pp. 393–401. [In Russian. French summary.]

A table in the paper shows that in 3,042 examinations worms were found in the following percentages: *E. vermicularis* 89, ascaris 5.5, taenia 3, trichuris 0.8, *H. nana* 0.7, *Dicrocoelium lanceatum* 0.3, *Diphyllobothrium latum* 0.03. It appears from the summary that diagnosis depended entirely on scraping the perianal area with a spatula and the careful cleaning of the spatula on the edge of a slide. Sometimes "the spatula was centrifuged" in water. Apparently an anthelmintic added 8 per cent. to the diagnosis as above advocated. The place concerned is Ufa. *Enterobius* infection is held to take place often by the aspiration of dust.

C. L.

LUBIENIECKI (H.). Zur Frage der individuellen Verschiedenheiten in der Entstehung und im Verlaufe der Oxyuriasis. [**Individual Variations in the Origin and Cause of Oxyuriasis.**]—*Wien. Klin. Woch.* 1929. Nov. 28. Vol. 42. No. 48. pp. 1526–1531. [14 refs.]

The literature is surveyed and it is concluded that oxyuris can reinfect without oral reinfection, blood is its probable food, possibility of any infection hangs on the individual person and even on the individual moment, and depends presumably on the amount of intestinal fermentation and on the state of the blood. Further investigation is suggested.

C. L.

CHIARI (Hermann). Ueber das Vorkommen von Oxyuren im menschlichen Eileiter. [**Occurrence of Oxyuris in Human Oviduct.**—*Virchows Arch. f. Path. Anat. u. Physiol.* 1928. Oct. 12. Vol. 269. No. 3. pp. 730-738. [24 refs.]

In the distended Fallopian tube of a woman of 20 removed for pelvic peritonitis was found a mature female threadworm. The anatomical condition of the organ is described.

C. L.

MAPLESTONE (P. A.). **A Case of Human Infection with a Gnathostome in India.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 610-614. With 2 text figs. [21 refs.] [School of Trop. Med. & Hyg., Calcutta.]

Maplestone reviews 10 previous reports on gnathostome infection in man, and describes a new case in a Mahommedan male of 26, who had never left Bengal. A swelling appeared between the right thumb and forefinger without pain or tenderness. It spread after 3 or 4 days to the dorsum and palm of the hand, and to the middle finger, at whose tip, after about 2 days more, a whitish point showed. On being pricked the worm escaped and all inflammatory signs, which had included enlargement of the epitrochlear gland, rapidly disappeared. The worm was a gnathostome 3.56 mm. long, the head had 4 rows of spines 12 to 16 μ long, and 9 to 14 μ broad. The body ridges over the whole body carried spines, so that it is held unlikely that it was an immature *G. spinigerum*. The zoological position, geographical distribution and biology are discussed. Human gnathostomiasis has now been reported from India, in part of which at least animal infections are not uncommon.

C. L.

SPREHN (C.). *Diplogaster lirata* (Schneider, 1866) Oerley, 1885, ein freilebender Nematode im Urin eines Mannes. [**A Freelifing Nematode in Human Urine.**—*Cent. f. Bakt.* I. Abt. Orig. 1928. Aug. 21. Vol. 108. No. 5-6. pp. 310-313. With 2 text figs. [14 refs.] [Vet. Inst., Univ., Leipzig.]

The nematodes were found in preparations sent to the Zoological Museum, Berlin University, by Professor ROSIN of Berlin. The man from whom they came had urethritis, and the worms are accepted as having been passed in the urine. The literature concerning free living nematodes in the urine is reviewed, and the specimens now reported described, figured and discussed.

C. L.

- i. BORREL (A.). Filaire et adéno-carcinome. [**Filaria and Adenocarcinoma.**—*C.R. Soc. Biol.* 1928. Vol. 99. pp. 1862-1865.
- ii. DOBROVOLSKAIA-ZAVADSKAIA (N.) & KOBOZIEFF (N.). Sur le rôle de la filaire dans les cancers de la souris. [**The Rôle of Filaria in Mouse Cancer.**—*C.R. Soc. Biol.* 1929. Oct. 25. Vol. 102. No. 27. pp. 307-309. [2 refs.]

i. Borrel describes a technique and results which may bear on human filariasis though they were designed to investigate any possible connexion between filaria and mammary cancer in mice; they involved the staining and clearing of the whole skin in the tanner's sense. The shaved body is pinned out on cork covered with white paper, and

through a median incision the whole of the rest of the body is dissected from the "skin" and removed. On the cork are left the skin and subcutaneous tissues, including the four mammae. The cork and its burden are placed in 10 per cent. formol for 12 hours, strong alcohol 12 to 24 hours, and toluidine blue (10 per cent.) for 6 to 12 hours. The stained sheet of tissue is detached from the cork, lightly differentiated in 1 per cent. acetic acid, dehydrated in absolute alcohol which produces adequate decolorization, and cleared in xylol. Moreover, by skill and practice it has been possible to split the tissue and produce quite thin preparations. Examination of these membranes has disclosed filariae in 80 per cent. of cancerous mice and 20 per cent. of non-cancerous ones.

The other reactions are of yet greater interest in tropical pathology. The "skin" shows deeply stained lines 0.5 cm. to 2 cm. long, produced by collections of lymphocytes which are held to be haunts of filariae as characteristic as the form of a hare, and to show clearly the length of time during which a parasite has remained stationary. In one such "form" a male and female parasite were present, and another skin which had three parasites showed 10 "forms." Yet again chiefly, but not exclusively in male mice, the "skin" shows cysts, and in one Borrel has already reported the presence of a male and female filaria. [Clearly these observations have significant bearings on the tissue reactions of man to loa and onchocerca.]

ii. The authors examined by Borrel's method 40 mice, 38 of them having mammary tumours, and found filariae in 5 cases only—one leukaemic lymphadenoma, one sarcoma, and three adeno-carcinomata. Of their mice, then, 87 per cent. developed mammary tumours without filariae being discovered.

C. L.

COUTELEN (F.). Nature et rôle biologique du corps central interne des microfilaires. [**Nature and Biological Function of the Central Body of Microfilariae.**]—*Ann. Parasit. Humaine et Comparée*. 1929. Sept. 1. Vol. 7. No. 5. pp. 410–418. [29 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Intra-vitam staining with neutral red has convinced Coutelen that the central body of microfilariae consists of an elongated vacuole with walls which become stained. The contents of the vacuole are granular. These granules, which may be few or many and in appearance are typical of vitelline vacuoles or particles of secretion, do not stain. He considers that they are vitelline in function and origin and constitute a nutritive reserve which remains over from the egg, and is of a protein nature with no evidence of glycogen.

C. L.

DE ROOK (H.). Filariasis onder de Papoea's aan den Boven-Digoel. [**Filariasis in Dutch New Guinea.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. Aug. 1. Vol. 70. No. 8. pp. 739–745. With 2 plates. [3 refs.]

De Rook found infection with *Mf. bancrofti* to occur fairly commonly in this district (Dutch New Guinea). Of 216 men examined in daytime 11 per cent. were found to be carriers, of 32 men examined at night 25 per cent. *Mf. malayi* was only met with in carriers imported from elsewhere. Periodicity in *Mf. bancrofti* was found to be typically

nocturnal, the numbers found by night compared with those found by day varying between 102 to 1 and 434 to 1, while with *Mf. malayi* they were 22 to 1. The latter was not so typically nocturnal.

Hydrocele, fibrosis testis, elephantiasis and enlargement of the inguinal glands were common.

About the transmitter nothing is known so far. The imported *Culex fatigans* cannot be incriminated; *Aedes variegatus*, suspected by BUXTON, is not found.

W. J. Bais.

VAN SLEE (W.). Onderzoek naar het voorkomen van filaria te Mamoe-djoe. [**Filariasis in Mamoe-djoe.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. May 1. Vol. 70. No. 5. pp. 444-450. With 1 plate.

In the district of Mamoe-djoe (west coast of Cèlebes) out of 1,024 natives 24·7 per cent. were found to be infected with filaria, for the greatest part *Mf. malayi*, in exceptional cases *Mf. bancrofti*. The periodicity of *Mf. malayi* is exclusively nocturnal (15·1 microfilariae at night against 1 in daytime). As regards the clinical symptoms the author states that *F. malayi* can cause the same manifestations as *F. bancrofti*. No chyluria was seen.

W. J. Bais.

KNAP (C. Reeling). Filariasis op Kabaena. [**Filariasis on Kabaena Island, Dutch East Indies.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. Apr. 1. Vol. 70. No. 4. pp. 305-311. With 1 map in text.

Kabaena is an island of mountainous character in the D.E.I. archipelago, south of Celebes. The author spent 9 days on the island and took the opportunity to collect data concerning the spread of filariasis. In various villages 540 specimens of blood were taken in daytime and 96 at night, of which respectively 37 and 28 were found to contain *Microfilaria bancrofti*. As clinical manifestations of the infection several cases of lymph scrotum and of hydrocele were noted, no chyluria, no undoubted elephantiasis. No search for the vector was made.

W. J. Bais.

- i. O'CONNOR (F. W.). **An Experiment in the Treatment of Filarial Lymphangitis by Subcutaneous Injections.**—*Porto Rico Jl. of Pub. Health & Trop. Med.* 1929. Sept. Vol. 5. No. 1. pp. 11-15. [2 refs.] [Med. Dept., Columbia Univ., New York, & School of Trop. Med., San Juan, Porto Rico.]
- ii. —, GOLDEN (Ross) & AUCHINCLOSS (Hugh). **The Roentgen Demonstration of Calcified *Filaria bancrofti* in Human Tissues.**—Reprinted from *Amer. Jl. Roentgenology & Radium Therapy*. 1930. May. Vol. 23. No. 5. pp. 494-502. With 13 text figs. [11 refs.] [College of Physicians & Surgeons, Columbia Univ. & Presbyterian Hosp., New York.]

i. Lymphangitic patients often have a local spot of itching or excessive pain coming on before or during a lymphangitic attack. Since these symptoms may indicate the presence of a worm the sites were

injected with sulpharsphenamine 0.2 gm. dissolved in 2 cc. of a sterile 1 per cent. solution of novocaine. The persons chosen for treatment were suffering from lymphangitic attacks monthly or oftener, could clearly indicate a spot of the nature described, and that spot lay on the distal part of a limb, a fact which eliminated confusion from secondary inflammation of a lymph gland. The injections were painless or nearly so, there was no reaction local or general. Of the 20 cases which had been treated 5½ to 6 months earlier, 18 had had no further attack. In the other two the subsequent attack began elsewhere than at the place injected. Controls in which novocaine only is being injected are being tried.

ii. A number of observers have shown that there may be grouped together, particularly in lymphatic glands, adult filariae living, dead, and calcified. A mass comprising testicle, hydrocele and spermatic cord removed after death was subjected to X-rays: "Scattered throughout its shadow are small elongated ovoid areas of calcium density which range in size from about 1 mm. in width and 2 to 3 mm. in length to tiny dots" either single or in chains of 2 or more. Some of these were examined and shown to be calcified filariae. In a woman suffering from attacks of filarial lymphangitis, accompanied by tender areas as mentioned and with commencing elephantiasis, X-ray photos showed certain shadows in these tender areas provided the limb was arranged so that they lay in profile. Three such areas were excised and report is made on an examination of two out of five portions of one of them, these being two in which the rays showed shadows. Worms were found in both portions, and were considerably or only faintly calcified. Fibroblasts and multinucleated giant cells were present. A fibrous capsule surrounded a worm with no evidence of living endothelial cells. The worm appeared to be lying in connective tissue and the blood vessels near it were enormously thickened or even occluded. Other cases are cited.

"These studies seem to indicate that the infection may be quite extensive. Since six worms were found in a small subcutaneous area it is possible that many others might be revealed by a long and careful search. Fifteen shadows or groups of shadows were detected in one elephantoid leg. . . . Inasmuch as excision of 'focal spots' containing living worms from an elephantoid leg has been followed by improvement in symptoms, the roentgen demonstration of calcified filariae may aid in localizing the attack on the disease."

C. L.

KORKE (Vishnu T.). **Observations on the Atypical Variety of *Bancrofti* and its Significance. Part IV.**—*Indian Jl. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 1023-1032. With 12 figs. on 1 plate. [6 refs.] [Central Research Inst., Kasauli.]

The average measurements of 20 "atypical" microfilariae from Balasore, Orissa, are compared with 18 typical forms. The first of the paired measurements which follow are from typical, the second from atypical microfilariae. They signify the distance from the head end as a percentage of the total length. Cephalic space 6 to 10 against 4 to 6, nerve ring 20 to 21 against 19.6, excretory pore 29 to 32 against 28.6, anal pore 80 to 85 against 77.5, the last tail cell 95 to 97 against 93. Thus the unnucleated tail portion is longer, it is abruptly drawn out,

bulbous towards the middle, then straight but deflected at an angle, the bulb having one granule and the rest about three. The characters, it is noted, approach those of *Mf. malayi*, the atypical forms appear to be associated with areas where elephantiasis of the lower extremities is present, while the typical forms are connected similarly with hydroceles.

C. L.

ACTON (H. W.) & RAO (S. Sundar). **The Importance of Secondary Infections in the Causation of Filarial Lymphangitis.**—*Indian Med. Gaz.* 1929. Aug. Vol. 64. No. 8. pp. 421–423.

The authors summarize the results of two years' investigation. Lymphatic obstruction in filariasis is: (a) chronic, usually aseptic, the result of helminthic damage to the glands; (b) acutely inflammatory with secondary invasion by a micro-organism which after close search they have nearly always found already occupying some primary focus elsewhere. A primary focus occupied by some kind of micro-organism they have always found, though the micro-organisms in this focus and in the acute lymphangitis have not always been the same. The primary focus may be external and usually temporary, a traumatic lesion, or tinia infection; or it may be internal in the mouth or gut. They have invariably found that removal of the oral focus or treatment of, say, dysenteric ulceration has caused disappearance or great reduction in frequency and gravity of the acute lymphangitic attacks. The cases tabulated number 28. In one the only "focus", an internal one, is described by the single word "hookworm."

C. L.

ACTON (H. W.) & RAO (S. Sundar). **"Kataphylaxia", a Phenomenon seen Clinically in Filariasis.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 601–610. With 20 figs. (2 coloured) on 4 plates. [15 refs.]

The authors consider kataphylaxia, or localized failure of the defence mechanism, under the heads epiblastic as when loss of the keratinized epithelium allows entry of micro-organisms, mesoblastic as when the pulmonary passage of hookworm and ascaris larvae is followed by a [bacterial] pneumonia or bronchitis, and hypoblastic as when an intestinal lesion allows *Bact. coli* to enter the tissues. They have been unable to demonstrate a toxin in *Filaria bancrofti*, mainly from the difficulty experienced in recovering adult worms, but point to eosinophilia as an evidence that one exists. For two reasons they believe that the toxin is poured out with the embryos. Firstly, in 100 cases with microfilaria in the night blood the eosinophilia percentage was 8.96; in 100 with "such types of filarial infection as filarial lymphangitis or lymphatic obstruction" but no microfilariae it was 4.62. Secondly, the lumen of a lymphatic vessel which they sectioned contained many desquamated endothelial cells about the head end of a gravid female filaria which it contained and few about the tail end—and the vulva lies near the head end. The bacterial toxins of a secondary bacterial infection produce a polymorphonuclear reaction. An endothelial plug

such as they reported, and post inflammatory fibrosis with contraction, would cause lymphatic blockage. Parturition and irritation are regarded as occurring intermittently for a few days only in each month, the evidence for this suggestion not being stated.

The commonest site in which the authors have found adult filariae is apparently not in the main abdominal lymphatics, but in those vessels which lie at the hilum of a gland or which are varicose. Immature forms they have found in narrow vessels, either small lymphatics or those narrowed by fibrosis, a finding explained as an aberrant but active migration marked by "endeavour," a migration which is undertaken when main passages are blocked. The different clinical manifestations of filariasis are explained on the dosage of infecting immature forms which is received. When the dosage is small and spaced, little irritation is induced by the passage of infecting forms and few symptoms result; when the dose is large and frequent, inflammation and obstruction are great. A coloured plate shows a gland removed from the vicinity of leprosy lesions and containing a young male worm in a giant-cell-containing tissue with central necrosis, and another with oedema round the contained filaria.

It would appear, then, that the symptoms of obstruction are attributed by the authors in great part to immature forms.

C. L.

PANDIT (C. G.), PANDIT (S. R.) & IYER (P. V. Seetharama). **The Adhesion Phenomenon in Filariasis: a Preliminary Note.**—*Indian J. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 946-953. With 3 figs. on 2 plates. [2 refs.] [King Inst. of Preventive Medicine, Guindy, Madras.]

The technique consists in mixing 8 cc. of night blood containing *Mf. bancrofti* with 2 cc. of a 2 per cent. citrated normal saline solution. Equal quantities of this mixture and of the serum to be tested are then intimately mixed in tubes and "incubated" at room temperature overnight. Next morning (one to two hours, however, suffices) the tube is rolled between the fingers to mix its contents and a drop examined under the microscope. In a positive reaction microfilariae become sluggish or perish and are coated with adherent leucocytes. Red corpuscles do not adhere. In 32 cases of active elephantiasis having no microfilariae in the night blood the reaction was positive in 25; in 10 with blood microfilariae but no clinical lesions there was no reaction; in 3 with no microfilariae but with a history suggesting transient filarial infection many years earlier one showed the phenomenon; in 13 healthy persons 3 showed adhesion; two had lived long in highly filarial areas, the history of the other was not available. The reaction begins within an hour, at which time microfilarial activity is still marked. Bacteria and yeast cells are not attracted. The presumed antibody is unaffected by a temperature of 56° C., the phenomenon does not take place with other microfilariae and occurs equally well under air, CO₂ or H₂. Sera from cases of elephantiasis with microfilariae in the blood have not been investigated, being very rare in the area concerned. It is suggested that the absence of microfilariae in elephantiasis is explained by the action of this phenomenon.

C. L.

COUTELEN (F.). Essai de culture *in vitro* de microfilaires de Bancroft. [**Culture *in vitro* of Bancroft's Microfilaria.**]—*Ann. Parasit. Humaine et Comparée*. 1929. Sept. 1. Vol. 7. No. 5. pp. 399-409. With 2 text figs. [17 refs.] [Parasit. Lab., Faculty of Med., Paris.]

About 50 cc. of blood was removed from a man with nocturnal microfilarial periodicity and the serum divided into three equal portions. One remained as a control, to the second was added an equal volume of normal saline, and to the third every four days 2 cc. of a 1 per cent. glucose solution in normal saline. The whole was prepared and maintained under conditions of strict sterility, and samples were removed from the bottom of the tube as required for periodical examination. The larvae lived as long as 32 days. After some days they lost their sheaths; the central body had disappeared completely in 20 days; the length was increased by a fifth and the width doubled in 30 days, and there appeared digestive, excretory, and genital outlines, the result of active multiplication of somatic or genital cells. The changes took place at laboratory temperature, whose level—an important point—seems nowhere noted.

C. L.

BRANGWIN (C. H.). **Treatment of Filariasis Bancrofti.** [Memoranda.]—*Brit. Med. Jl.* 1929. Sept. 21. p. 539.

A case with elephantiasis of a leg showed in the night blood "numerous *Filaria bancrofti*." He received weekly injections of 1 cc. of moogrol. After six injections the calf had lost $\frac{1}{4}$ to $\frac{1}{2}$ an inch in circumference weekly. The blood was not again examined.

C. L.

ACTON (H. W.) & RAO (S. Sundar). **A Case of Filarial Abscess.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 631-632. [2 refs.]

From an acute abscess in the right femoral region were obtained incomplete but living adult filariae 22 and 10 mm. long and full of eggs and nearly mature embryos, and also a haemolytic streptococcus which was also found about some teeth and in the urine obtained by catheter. The faeces were free from it and from protozoa and helminthic ova.

C. L.

MORENAS. Un cas de filariose dû à *Acanthocheilonema perstans* avec manifestations cliniques et grosse éosinophilie. [**Infestation by *Acanthocheilonema perstans*, with Clinical Signs and High Eosinophilia.**]—*Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 325-330.

A man who died with fibrosis of the left ventricle and a hypertrophied spleen, dyspnoea and oedema, had had an eosinophilia of 50, 35 and 19 per cent. and had been treated warily with stibyal. *Mf. perstans* had been present in the blood, but no adults were found in the serous membranes at autopsy.

C. L.

VOGEL (Hans). Ueber *Microfilaria demarquayi* und die *Microfilaria* aus Tucuman in Argentinien. [*Mf. demarquayi* and the *Microfilaria* from Tucumán.]—*Abhandl. a. d. Gebiet d. Auslandskunde, Hamburg. Univ.* 1927. Vol. 26. (D. Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 573–584. With 4 text figs. [20 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

MANSON named *Mf. demarquayi* in 1895 from blood smears obtained from St. Vincent and St. Lucia in the West Indies. In 1914 AROAZ and BIGLIERI found a microfilaria in the Province of Tucumán in North Argentina and named it *Mf. tucumani*. Vogel has measured and examined about 40 specimens of the reputed new species and compared them with a nearly equal number of *Mf. demarquayi*. The minute anatomy, the size, and the relative distances of the various fixed points recognized in microfilariae lend no weight to the suggestion that these are two species.

C. L.

HOFFMANN (Carlos C.). Nota sobre la existencia de la *Microfilaria ozzardi* en la Península de Yucatán. [*Embryos of Filaria ozzardi in Yucatán.*]—*An. Inst. Biol. Univ. Nac. Mexico.* 1930. Vol. 1. No. 1. pp. 55–57. With 1 text fig. [3 refs.]

The author states that *Microfilaria ozzardi* had not been recorded previously in Yucatán. He found them in a considerable number of specimens of blood examined in 1927 and 1928, his diagnosis being confirmed by Professor FÜLLEBORN.

H. H. S.

PEON (I. E.). **Loa Loa—Case Report.**—*Eighteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1929. pp. 229–231. [Chiriqui Land Company Hosp., Puerto Armuelles, Panama.]

Two years after leaving the West Coast of Africa, a series of Calabar swellings appeared on various parts of the face of a sturdy man during six days only. Eleven months later the man was awakened by "something biting" in the left external canthus. A loa was removed under cocaine. He next had tartar emetic intravenously in 6 increasing doses over 3 weeks, amounting in all to 0.25 gm., and 3 days later a course of 4 doses of neosalvarsan, 1.95 gm. in all, over 20 days was begun. Under the latter, microfilariae greatly lessened, but were present in large number about a month later.

C. L.

SHARP (N. A. Dyce). **Loa loa Infections. A Case with Rapid Onset of Symptoms.**—*Lancet.* 1929. Oct. 12. pp. 765–766.

One week after the probable date of infection, namely, a day on which he was severely attacked by chrysops, or 61 days after the earliest possible date of infection, namely, that on which he first landed in West Africa, a man of 23 began to manifest Calabar swellings at short intervals about the upper limbs and head. On one occasion there was a sensation as of something moving (near the knuckle of the right ring finger), but no worm has been visible. Eosinophilia is present. Neither the emission of microfilariae nor the death of worms, the two causes put forward for these swellings, meets this case.

C. L.

LAIGRET (J.). Onchocercose humaine et éléphantiasis au Soudan français. [**Onchocerciasis and Elephantiasis in Man in the French Sudan.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 499-506. With 4 plates. [8 refs.] [Vaccine & Biol. Lab., Bamako, Sudan.]

After surveying the steady extension of the area in Africa known to contain *Onchocerca volvulus*, Laigret gives the result of his recruiting experience in Bamako and Bougoumi, French Sudan. In Bamako 4.5 per cent. of 3,860 young men between 16 and 25 years showed onchocerca cysts. In Bougoumi percentages were as high as 45 in humid areas. Cysts were mostly about the anterior superior iliac spines and trochanters, thoracic cysts being relatively rare. Cutaneous lesions are described, namely, keratoderma, xeroderma and a pseudo-ichthyosis without desquamation, and affect 50 per cent. of those who have cysts. Elephantiasis cases rarely reach the recruiting medical officer; but regarding those seen there was no evidence of onchocerca infection in the old ones; in early cases, cysts and microfilariae in sections and on puncture of glands are detected. Onchocerca infection was rarely permitted to exempt from service.

C. L.

- i. HOFFMANN (Carlos C.). Investigaciones sobre la transmision de la Onchocercosis de Chiapas. [**The Transmission of Onchocerciasis in Chiapas.**]—*An. Inst. Biol. Univ. Nac. Mexico.* 1930. Vol. 1. No. 1. pp. 59-62. With 2 text figs.
- ii. OCHOTERENA (I.). Contribución para el conocimiento de la Onchocercosis en Mexico. [**Onchocerciasis in Mexico.**]—*Ibid.* pp. 77-82. With 5 text figs.

i. The species of onchocerca found in Mexico is *O. caecutiens*. The author found filarial embryos in the stomach of two species of simulum, *S. mooseri* and *S. ochraceum*, shortly after they had fed upon a patient. Further investigations showed that development proceeded normally in the former, but that the embryos soon disappeared from the latter, as if this species possessed defences against the parasite.

ii. The second paper describes the finding of numerous embryos in the excised eye of a blind man; the eye was fixed entire and serial sections made. The embryos were aggregated particularly "in the outer third, in the corneal epithelium."

H. H. S.

DEL FAVERO (E.). Localizzazione abnorme di *Filaria medinensis* in seno ad una ghiandola inguinale. [**Filaria medinensis found in an Inguinal Gland.**]—*Arch. Ital. Sci. Med. Colon.* 1928. May. Vol. 9. No. 5. pp. 277-280. With 1 text fig. [4 refs.] [Inst. of Exot. Path., Univ., Padua.]

Diagnosis of the worm rests on the statement of the writer and the observation that in the fluid round it there were very many microfilariae with cylindrical body ending in a filiform tail. The subject was an Indian from Bombay and Aden.

C. L.

SMILLIE (W. G.). **Hookworm Disease.**—Reprinted from *Nelson Loose-Leaf Medicine*. 1928. Nov. Vol. 2. pp. 477-490G. With 11 text figs.

It is noted that even mild hookworm infections are important, and that the disease constitutes one of the gravest menaces to physical,

mental and economic progress. The descriptions of the parasites will probably not convey a clear impression of the anatomy as it is, nor does Smillie appear to accept the specific identity of *A. braziliense* and *A. ceylanicum*. Under the life history and mode of infection is found a good account of the matter as it stood at the beginning of 1928. Pathology, including the blood picture, is next taken up. Persons with 25 worms or less are classed as carriers, whom it is held seldom advisable to treat on the ground that the results achieved would not compensate the individual for the discomfort and slight hazard involved. Under diagnosis by microscopic examination of faeces there are mentioned direct smear, Willis method, Caldwell method, and D.C.F., and it is added that these various methods are very accurate in determining whether or not a patient harbours hookworms, but if this implied uniformity were the general experience, none would have troubled to devise and test ovum concentrative methods. For the determination of the degree of infection Stoll's method of egg counts with its implications and its allowances for stool consistence are advised. Treatment occupies an adequate proportion of the total space; the best method is held to be by a mixture of carbon tetrachloride and oil of chenopodium on the ground that neither increases the toxicity of the other. This seems to express general opinion on the matter, though the abstractor believes it to be contrary to the facts.

C. L.

- ALFEJEW (Sophie). Zur Frage ueber die Wanderung der Ascariden und Oxyuren im Gewebe der Darmgeschwulst beim Menschen.—*Ztschr. f. Parasitenk.* Berlin. 1928. Oct. 27. Vol. 1. No. 3. pp. 423-436. With 7 text figs. [40 refs.] [Path.-Anat. Inst., & Zool. Inst., Milit. Med. Acad., Leningrad.]
- BANAJTIS (S. I.). Oxyuren und Appendicitis.—*Arch. f. Med. Wiss.* 1929. Vol. 2. No. 1 (4). pp. 115-128. With 1 text fig. [14 refs.] [In Russian. German summary p. 129.]
- FAUST (Ernest Carroll), CAMPBELL (Horace E.) & KELLOGG (Claude R.). Morphological and Biological Studies on the Species of *Diphyllbothrium* in China.—*Amer. Jl. Hyg.* 1929. May. Vol. 9. No. 3. pp. 560-583. With 8 text figs. [3 pages of refs.] [Peking Union Med. College, Peking, & Med. School, Tulane Univ., New Orleans.]
- FITZGERALD (R. D.). Notes on a Case of Dracontiasis.—*Malayan Med. Jl.* 1929. June. Vol. 4. No. 2. p. 78.
- JOYEUX (Ch.), GENDRE (E.) & BAER (J. G.). Recherches sur les helminthes de l'Afrique Occidentale Française. Monographie II. Collection de la Société de Pathologie Exotique.—120 pp. With 52 text figs. 1928. Paris: Masson et Cie., Editeurs, 120 Boulevard St. Germain. [20 Fr.—4s.]
- KU YUE CHI. Ueber Paragonimiasis Westermanni.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. May. Vol. 33. No. 5. pp. 287-299. With 2 text figs. [48 refs.]
- MATZINGER (Walter). Ueber die Askaridenallergie bei Säuglingen und die Spezifität der Askaridenreaktion.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1929. Vol. 60. No. 5/6. pp. 399-410. With 12 text figs. [15 refs.] [Dermat. Clinic, Univ., Zurich.]
- NAUCK (E. G.) & PICADO (C.). Fischfang und Wurmbabtreibung durch "Latex."—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Oct. Vol. 33. No. 10. pp. 536-542. With 2 text figs. [San Juan de Dios Hosp., San José, Costa Rica.]
- WEISS (Kurt). Kürbiskerne als Bandwurmmittel.—*Muench. Med. Woch.* 1928. Mar. 23. Vol. 75. No. 12. pp. 520-521.

ERRATUM.

Vol. 27, No. 6, p. 459, 2nd summary, line 7 of text. For *opressa* read *oppressa*.

LEPROSY.

LEPROSY REVIEW. 1930. July. Vol. 1. No. 3. 32 pp. Quarterly Publication of the British Empire Leprosy Relief Association, 29, Dorset Square, London, N.W.1.

This number includes an account of leprosy in Ceylon, with 1,000 known and an estimate of 3,000 lepers, with encouraging results from treatment in the early stages; and in the Assam hill state of Manipur, where 57 cases have been discharged as probably cured from the Kangpokpi Leper Colony under Dr. G. G. CROZIER. In Persia H. A. LICHTWARDT reports that alepol is less painful, and in 3 per cent. solutions intramuscularly and 1 per cent. ones intravenously yields more rapid good results than the ethyl esters, and the clinic is now attracting patients from as far as Russia and Afghanistan, as well as Persia. F. W. ROSS reports on a year's work on a Bengal treatment centre, which he started in some trepidation, but 250 lepers from an area of 100 miles now attend the weekly clinic with promising results. T. B. WELCH, in Trinidad, reports the successful control of febrile reactions after injections with a powder, orally, containing Aspirin grs. 10, Phenacetin grs. 5, Pulv. Ipec. Co grs. 5, with the addition of Calomel grs. 4 to the first dose. The patient is wrapped in a blanket and hot bottles are applied morning and evening.

L. Rogers.

LEPROSY IN INDIA. 1930. July. No. 3. pp. 83-122. With 3 text figs. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

Among several short articles in this number is one by MUIR on the treatment of residual leprosy, in which he advises control of dosage by the sedimentation test and pushing ethyl esters and iodides when it is below 20. Dr. GUPTA deals with anti-leprosy surveys and dispensaries, and he estimates the cost of a survey and treatment party of five officers for one year at Rs. 13,200. Other articles deal on well-known lines with personal prophylaxis of workers, routine examination of nasal smears and how to maintain attendances at clinics. Brief reports of four leprosy centres are also given.

L. R.

CHINA MEDICAL JOURNAL. 1930. Aug. Vol. 44. No. 8. pp. 737-883. **Special Leprosy Number.**

This number contains much detailed information regarding the incidence of leprosy in the different provinces of China in the form of reports on different areas, together with an interesting account of the early history of the disease by K. Chimin WONG with references to ancient literature, which indicate that the disease has been prevalent since the sixth century B.C. and that the earliest reference to use of chaulmoogra oil in the treatment of leprosy was during the 14th century A.D. Brief articles on the work of the Mission to Lepers by W. H. P. ANDERSON and on treatment by E. MUIR, by HEIMBURGER and YU, and at Tsinan by WATSON, and one on Ridding China of Leprosy by J. L. MAXWELL follow. In the last, compulsory notification, with dis-

pensary and hospital treatment on penalty of segregation if the patients do not attend, together with examination of all contacts twice a year to detect early cases, and segregation in homes and colonies of advanced infective cases are advocated. At Tsinan 110 cases have been treated and 38 were paroled as bacteriologically free. Gold preparations were useful in addition to hydnocarpus oil.

The contribution of A. J. WATSON contains some interesting observations in addition to a résumé of the recent advances in treatment. While sympathizing with English dermatologists who have failed to cure cases, he states that "those who have seen leprosy lesions clear up under chaulmoogra injections need no convincing of its value," and he goes on to deal with the chemistry of the oils and refers to the bactericidal effects of chaulmoogrates and hydnocarpates on acid-fast bacilli shown by WALKER and SWEENEY. He records his own experiments to show that ROGERS' sodium hydnocarpate (Alepol) inhibited the growth of the acid-fast *B. rabinowitsch* up to dilutions of 1 in 1,000,000, but oleates had no such effect, and other classes of bacilli, such as *Ps. pyocyanea*, are not affected by either. This shows a selective action of hydnocarpates on acid-fast bacteria of a most instructive nature, and he suggests that this action may be due to adsorption or solution of the acid in the fatty or waxy envelope of the bacilli. The significance of the lepra reaction is next discussed with illustrative temperature charts, and he points out in an analysis of the results of treatment in a considerable number of cases, that in those in which reactions are absent the treatment fails, but those showing repeated slight reactions always improve (as held from the first by ROGERS); during reactions congestion of the lesions with a polymorphonuclear reaction occurs, with the result that the drug can gain access to the bacilli and destroy them by bacteriocidal action, while in non-reacting failures the drug may never reach the bacilli deeply situated in advanced lesions. Hence the well-established good results in early cases, while the failures were all of over five years' duration. In an appendix he quotes the work of ADAMS, STANLEY and other American chemists to show that chaulmoogric preparations of low molecular weight have greater bacteriocidal action than the higher ones, and he points out that this confirms ROGERS' preference for the lower melting point fatty acids of these oils, such as sodium gynocardate, and that the same principle is embodied in his latest preparation, alepol.

L. R.

GOLD COAST. Brief Report on the Leper Settlement, Ho, 1928-29 [COOKE (F. H.), Medical Officer].—*Gold Coast Rep. on Med. & San. Dept. for Year 1928-1929*. Appendix D. pp. 125-127.

— **Report on Leprosy by the Medical Secretary to the Gold Coast Branch of the British Empire Leprosy Relief Association** [DIXEY (M. B. Duncan)].—*Ibid.* Appendix E. pp. 127-132.

Dr. F. H. Cooke reports on the further progress during 1928-29 of the Leper Colony at Ho, in the Togo area of the Gold Coast, which owes so much to him. The construction of a permanent settlement enabled the resident inmates to be raised from 95 to 350, making, together with 68 out-patients, a total of 418. During the year 5 were discharged "cured" and no less than 92 on parole as "apparently

cured," and they are seen monthly. For the year 1928-29 177 were so discharged, but 25 have been readmitted with nerve symptoms. The treatment used was alepol with moderate doses of potassium iodide, and it is stated that "After observing alepol treatment for over a year, I can say that the results warrant all the favourable reports on this drug published."

Dr. M. B. D. Dixey publishes his report for the year ending April, 1929, on leprosy work on the Gold Coast, which included extensive leprosy surveys and the formation of leper out-patient clinics at all stations with resident medical officers. He estimates the leprosy incidence at 7 per mille in the Ho district, where voluntary treatment and segregation have proved such a great success, as compared with the old German compulsory methods, that there are more voluntary applicants than can be accommodated. The nerve type forms 82 per cent. of the cases. In Accra nerve cases formed 56 per cent. After giving details of the lepers seen at various clinics, he concludes with the following important statement :—

"If one may judge from experience in other parts of the world, it may be stated with some confidence that the method of voluntary segregation in settlements, where modern methods of treatment can be employed, will be found more suitable than any compulsory methods, which will only lead to the hiding of cases till the disease is past the most remedial stage."

L. R.

NIGERIA. Report of the Nigerian Branch British Empire Leprosy Relief Association, 1928 [MAYER (T. F. G.), Secretary.]—*Ann. Med. & San. Rep. Nigeria, 1928.* Appendix K. pp. 153-156. With 1 folding map.

After describing the foundation of the Nigerian Branch of the British Empire Leprosy Relief Association, figures are quoted to show 2,046 lepers, including 616 in-patients in 1927, and 2,112 in-patients and 863 out-patients, a total of 2,975, in 1928. As the result of a long tour Dr. Mayer advocates the establishment of self-supporting colonies, where both the early and the infectious cases may be treated and their children protected from infection. He reports that the Native Administrations are intensely interested in the matter, and will welcome and assist the formation of treatment centres in their midst. A large map showing the medical centres and activities of the Province completes an interesting report.

L. R.

RAMSAY (G. W. St. C.). A Study of Leprosy in Southern Nigeria.—*Ann. Med. & San. Rep. Nigeria, 1928.* pp. 89-98. [6 refs.]

This is a further report on the work of the Leper Colony at Itu, founded by Dr. MACDONALD, and managed by the United Free Church Mission. The incidence of the disease is estimated at the high rate of 30 per mille in parts of Southern Nigeria, and the people are scattered over countless small farms, so compulsory segregation is impracticable. As large numbers of lepers had camped near Itu for the sake of treatment, a colony has been formed on thirty acres given by Government, much of their food is grown by the patients, and the population is now over 600, about two-thirds being males. An analysis of 616 cases

showed that the duration of the disease varied from 2 months to 30 years, with an average of 6.1 years, and in three-quarters the disease began between the ages of 16 and 35 years. The people recognize the early stages, and no less than 80 per cent. are maculo-anaesthetic and only 4.4 per cent. nodular. As a whole, the cases are of recent origin and favourable for treatment, and less than 10 per cent. of the maculo-anaesthetic cases showed lepra bacilli in their nasal smears.

L. R.

HAYES (T. H.). **Leprosy in the Virgin Islands.**—*U.S. Nav. Med. Bull.* 1930. Apr. Vol. 28. No. 2. pp. 292-309.

Leprosy was apparently introduced here by the slave trade and from other West Indian Islands long ago, and in 1888 a leper house was opened and 29 patients admitted, or about one-fifth of the known lepers according to EHLERS. Segregation was very imperfect, and during the sixteen years up to 1903, 127 lepers were received, 34 remained in the home, and 73 had died. In 1896 82 cases were found. In 1904 EHLERS advised the same system of segregation as he used in Iceland, and he collected funds in Denmark for a new isolated leper colony in 1908, which is still at work, with 79 inmates in 1927, and a probable total of about 90, or 3.45 per mille. in the Islands. There is a high proportion of young cases, indicating recent spread in the favourable hot humid climate. Land permits the lepers to grow crops, the sexes are separated, and a native nurse and treatment are provided. Females preponderate, as they attend hospital most, and are there detected. The cases are mainly of the mixed type; release of "burnt-out" nerve cases is advised to lessen congestion of the colony. Ethyl-esters have produced gratifying progress in some cases.

L. R.

HURWITZ (Ezra). **Palo Seco Leper Colony.**—*Rep. Health Dept. of the Panama Canal for Year 1928.* pp. 49-53. With 2 plates.

This is a brief description of the leper colony in Panama with 103 inmates. Marriages are occasionally allowed, but children of leper women are removed at birth and placed with relatives. Ethyl-ester treatment is used and 34 cases have become negative bacteriologically, but most are crippled.

L. R.

BRAY (George W.). **The Story of Leprosy at Nauru.**—*Proc. Roy. Soc. Med.* 1930. July. Vol. 23. No. 9. pp. 1370-1374 (Sect. Trop. Dis. & Parasit. pp. 26-30).

This is a most instructive and encouraging account of the application of modern methods in dealing effectually with a most serious leprosy epidemic in a small Oceanic island under Australian administration. The disease was unknown before 1912 and was probably introduced by a Gilbert Island woman; in 1920 four cases were known, including a girl who had frequently visited the first patient. In October, 1920, 30 per cent. of the whole population of 2,500 died of influenza, and great ill-health and debility remained, together with a definite dietary deficiency, and 3 of the lepers died. Under these unfavourable

conditions, leprosy increased so rapidly that, within four years of the influenza epidemic, no less than 30 per cent. of the whole population were infected, and of the first 34 cases, 9 were relatives of the surviving early leper, and 3 more of one of those who died during the epidemic. With the exception of one district, nearly every family was infected, so practically every native had been in contact with a leper. No less than 90 per cent. of the cases were of the maculo-anaesthetic and 5 per cent. each nodular or nerve cases.

The paper goes on to relate "The Story of the Conquest" in which early diagnosis was by means of monthly examination of all the people, and bacteriological examinations with segregation on one side of the Island of infective cases, and treatment of the bacteriologically negative cases as out-patients, but with separate sleeping accommodation from the uninfected. During 1927, 67,000 injections were given of chaulmoogra and hydnocarpus preparations; the maximum number of cases was reached in 1925 with 189 segregated and 176 treated as out-patients at clinics, or a total of 365; 30 per cent. of the population and the worst epidemic on record as far as the reviewer knows. Yet within three years the number of cases remaining had fallen to 132 segregated and 86 treated at clinics; a total of 218, or a 40 per cent. reduction within three years. Great attention was paid to cleanliness, diet and recreation and a good sign is the diminution in the number of children affected each year, since they are most susceptible. [The success of the above plan is very gratifying to the reviewer as he advocated it in "Leprosy", and some years ago he was consulted regarding the Nauru outbreak and advised the methods above described. Moreover, Dr. Bray has informed him that not a single early discovered case has gone on to the nodular stage, so the Nauru experience strikingly confirms his contention that the frequent examination of all leper contacts and the immediate treatment of the earliest stages thus discovered is the key to the elimination of leprosy from any country, and consequently anything which leads the early cases to be hidden is harmful.]

L. R.

KAISER (L.). Leprabestrijding en leprabehandeling in de Onderafdeelingen Madjene en Mamasa (Celebes en Onderh.) in 1925-1929. [**Combating and Treatment of Leprosy in Madjene and Mamasa (Celebes).**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. July 1. Vol. 70. No. 7. pp. 712-724. With 2 text figs. & 4 figs. on 2 plates.

This article contains much information on the frequency of leprosy in these districts and their subdivisions, which is merely of local interest. The leper colony Kampong Baroe, founded upon the principle of voluntary segregation and self-management of the lepers, is described in some detail. The treatment administered in the colony aims at

- (1) Treatment of the local affections of the skin (ulcers, complicating affections like scabies, etc.).
- (2) Specific treatment as far as possible by means of a mixture of : chaulmoogra oil 20, thymol 9, camphor 3.
- (3) Treatment of intercurrent diseases.
- (4) Psychical treatment of the lepers especially supports their belief in the possibility of a cure.

W. J. Bais.

ARAÚJO (H. C. de Souza). Curso de leprologia pelo radio. [**Broadcasting Lectures on Leprosy.**].—*Rev. Med.-Cirurg. do Brasil*. 1930. Mar. Vol. 38. No. 3. pp. 89–108.

In this article are given the first three of a prepared series of 14 broadcastings on the subject of leprosy. They are of general interest as being addressed to the laity. The first deals with the problem of leprosy in Brazil, the second as it affects S. Paulo in particular, the third the scheme for dealing with the disease in S. Paulo, with an account of the St. Angelo leprosarium and the cost of upkeep of the staff of this and other institutions, and of providing for inspection and prophylaxis.

H. H. S.

LABERNADIE (V.). Contribution à l'étude de la contagiosité de la lèpre. [**The Contagiousness of Leprosy.**].—*Rev. Méd. et Hyg. Trop.* 1930. May–June. Vol. 22. No. 3. pp. 114–137. [Refs. in footnotes.]

This is a lengthy argument on the contagiousness of leprosy in the light of the incidence of the disease among French convicts living in French Guiana, as opposed to the old heredity theory. He points out that to account for the number of cases seen in these convicts, who lived in close contact with the infected indigenous population, on the heredity theory, there should be half a million cases of undiscovered leprosy in France, which is impossible. He concludes that contagion accounts for the incidence of the disease among the convicts, who were infected much in proportion to their opportunities of coming into contact with indigenous lepers.

L. R.

DE AMICIS (Arturo). Lepra autoctona e contagio leproso. [**Autochthonous Leprosy and Contagion.**].—*Riforma Med.* 1930. July 7. Vol. 46. No. 27. pp. 1081–1084. With 4 text figs. [1 ref.]

The patient, a woman of 24 years, had always lived in Naples. When seen by the author in 1924 she gave a history of the outbreak of red patches on her face from time to time accompanied by fever, and of scattered patches on the trunk and limbs. Examination revealed maculae scattered over the body, a nodule on the right conjunctiva and a perforating ulcer on the sole of the right foot. Hansen's bacillus was present in large numbers in the nasal mucus. The only possible source of contraction appeared to be her former fiancé, a sailor who had been in America. Three years later this patient mentioned a brother as suffering from 'arthritis deformans' and on seeing him the author at once diagnosed nervous leprosy with atrophic and deforming lesions of the hand. Inquiry into his history revealed that from boyhood he had lived in close association with a man who had been noted in 1901 by the author's father, Professor DE AMICIS, as a case of autochthonous leprosy (since dead).

H. H. S.

AUBIN & LABERNADIE (V.). Le réflexe oculocardiaque chez les lépreux. [**The Oculo-cardiac Reflex in Leprosy.**].—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 441–442. [Colonial Hosp., Pondichéry.]

Few studies appear to have been made of the sympathetic system in leprosy, so the authors have examined the oculo-cardiac reflex at

Pondichéry. They found among 100 cases, vagotonic reactions in 37, and sympathetico-tonic ones in 46, the latter being much more frequent in the anaesthetic type of the disease.

L. R.

MUIR (E.). **Ganglion-like Swellings in Leprosy.**—*Indian Med. Gaz.* 1930. Aug. Vol. 65. No. 8. pp. 444-445. With 1 text fig.

A brief account with an illustration is given of the occasional occurrence of ganglion-like swellings on the back of the hand in leprosy, which may appear and disappear again rapidly and are believed to be connected with disease of the median nerve.

L. R.

DIZON (Elpidio Y.). **Eye, Ear, Nose, and Throat Manifestations in Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1930. May. Vol. 10. No. 5. pp. 211-216. [5 refs.]

The lesions of these special organs are described, and stress is laid on anaesthesia of the cornea leading to the presence of unfelt foreign bodies. Iritis and keratitis are the most common causes of reduced vision. The ciliary body was affected in about 1 per cent. of cases, but the choroid appears to be nearly exempt and the motility of the eyes is not affected. Chaulmoogra preparations should be used in eye effections, but with great caution to avoid reactions, and atropine drops and subconjunctival injections of atropin-adrenalin help to break down early adhesions of the iris; salicylates and iodides are of use in iritis, with hot compresses to relieve the pain. The ear is only affected externally and the nose and throat symptoms are well known; for the latter tracheotomy may be required.

L. R.

HOFFMANN (W. H.) & BAEZ (Pedro Ramos). **La coroiditis leprosa precoz. [Early Choroiditis in Leprosy.]**—Reprinted from *Jl. dos Clinicos.* Rio de Janeiro. 1930. Aug. 15. Vol. 11. No. 15. pp. 225-233. With 2 coloured figs. on 1 plate.

The authors comment on the early signs of leprosy, which being very slight are liable to be overlooked, and thereby prognosis is rendered unfavourable, seeing that *early* treatment is necessary for cure to be attained. They then refer to a case, later described in detail, in which the only recognizable lesion was an ulcerative choroiditis of the right eye, and they recommend early examination by an ophthalmologist in suspicious cases.

The patient was a woman of 35; her father, mother, and two sisters were lepers, the father having died of the disease. This patient showed no general signs, and there were no acid-fast bacilli in the nasal mucus, but some ocular symptoms for which an ophthalmologist was consulted. He reported ulcerative choroiditis, believed to be tuberculous. The condition increased in spite of treatment. Antileprol was then given intravenously for 5 months, followed by krysolgan and that again by antileprol *per os*. Cicatrization of the lesions resulted, and 7½ months later there had been no recurrence nor any other signs of leprosy.

Professor Hoffmann remarks that for some years he has noted in patients at the Rincón leprosarium "the specific effect which gold salts, and especially krysolgan, has on leprosy affections of the eyes."

H. H. S.

HOFFMANN (W. H.). **Gold Treatment of Eye Affections in Leprosy.**—*Jl. Trop. Med. & Hyg.* 1930. Aug. 15. Vol. 33. No. 16. pp. 233-236. [Finlay Inst., Havana, Cuba.]

This is a further paper on this subject in which the author claims to have used krysolgan in twenty-five cases of eye lesions in leprosy with benefit in all, but no details of dosage or results are recorded.

L. R.

MOTTA (Joaquin). **Lepra latente y eritema polimorfo. [Latent Leprosy and Erythema multiforme.]**—*5a Reunión Soc. Argentina Patol. Regional del Norte, Jujuy, 7 al 10 Octubre, 1929.* Vol. 1. pp. 479-484. [Dermat. & Syph. Clinic, Faculty of Med., Rio de Janeiro.]

Distinction is made between leprosy with long incubation period and latent leprosy in which the focus is deeply situated and gives rise to no symptoms, the bacilli remaining, as it were, inactive until conditions favourable to their extension arise. During this period there may be accessions of fever and transitory rashes, the cause of which usually escapes recognition. Other symptoms not uncommon are attacks of sweating, headache, transient or more persistent, slight or severe, rheumatic pains and some degree of anaemia. MARCHOUX and SERRA maintain that whatever the mode of infection spread takes place by the lymphatic system chiefly. In this paper the author confines his remarks mainly to the transitory erythematous rashes, and notes that many leprologists call attention to the similarity between the early maculae of leprosy and erythema multiforme and the diagnostic differences. The author takes the line that this condition is one which may be actually due to Hansen's bacillus as one of several causes.

He relates a case in point: A man of 30 years had an attack of fever with general pains and a sparse but widespread rash, involving face, ears, arms, thighs and legs, with slight itching and feeling of tension. It passed off in a week, but more minute examination revealed alterations of sensation, patchy areas of hypo- and hyperaesthesia. A small fragment taken for section revealed no bacilli, but one of the inguinal glands was a little enlarged and juice from it showed lepra bacilli in large numbers. The author is of opinion, therefore, that the rash was due to a transient toxæmia produced by the latent bacilli. [The aetiology of erythema multiforme not being single, it is quite possible that lepra bacilli may be one cause, but the proof in this case is not quite complete since a gland containing the organisms and a febrile attack with a transient rash are not necessarily interrelated.]

H. H. S.

LIE (H. P.). **Pathological Changes in the Central Nervous System in Leprosy.**—*Acta Path. et Microb. Scandinavica.* 1930. Supplement V. pp. 32-35. [1 ref.]

This is a short paper recording recent investigations on the central nervous system in leprosy; from these the author concludes that the degenerative changes affect only the primary peripheral neuron. Nodular leprosy also progresses slowly to assume the picture of nerve leprosy. On the other hand, he holds that mental disease is not directly due to the lepra bacilli or their toxins, but is of psychogenic origin.

L. R.

MOLINELLI (Ernesto A.) & VACCAREZZA (Américo J.). El líquido céfalo-raquídeo en la lepra. [**The Cerebrospinal Fluid in Leprosy.**]—*5a Reunión Soc. Argentina Patol. Regional del Norte, Jujuy, 7 al 10 Octubre, 1929.* Vol. 1. pp. 487-495. [10 refs.] [José Penna Inst. for Infectious Diseases, Faculty of Med. Sci., Buenos Aires.]

After surveying the findings of previous investigators the author details the results in 69 patients observed by him. He noted the general appearance of the fluid, its tension (by Claude's manometer), the content of globulin (by Pandy and Nonne Appelt); of albumen (nephelometer), glucose (Folin and Wu), chloride (Motr), urea (Ivon), cells per cmm., presence of lepra bacilli, the W.R. and Lange's colloidal gold test. Among the 69 were 21 with nervous leprosy varying in age between 16 and 63 years and suffering from the disease for periods varying between 1 month and 28 years; 17 of the nodular form, between 18 and 52 years, with disease from 1 to 19 years; 31 with mixed leprosy, between 18 and 71 years, and the disease from 1 to 23 years.

The investigation must have entailed much careful work and the results, though negative, are consequently of value from the view of academic research, but of no diagnostic or prognostic importance. The findings in each case were within the normal limits. In four cases (two nervous and two mixed) there was a slight modification of the Lange reaction, but not sufficient to be of clinical significance; though the W.R. was uniformly negative with the spinal fluid, the sera of two nervous, five nodular and ten mixed were positive. The details are presented in tabular form.

H. H. S.

EUBANAS (Froilan). **Chemotherapy of Leprosy by the Use of Chaulmoogra Oil and its Derivatives and Other Synthetic Preparations.**—*Jl. Philippine Islands Med. Assoc.* 1930. May. Vol. 10. No. 5. pp. 203-210. [43 refs.]

A short historical review of modern treatments of leprosy, in which the author draws attention to the work of Roger ADAMS, of Illinois, in testing various synthetic acids of chaulmoogra on *Myco. leprae*, some of which are said to kill the organism in dilutions of 1 in 200,000. They may be worthy of clinical trial.

L. R.

FRAZIER (Chester N.) & CHEN (Foong-kong). **Effect of Intravenous Injections of Ethyl Esters of Chaulmoogra Oil on the Pulmonary Tissues of the Rabbit.**—*Philippine Jl. Sci.* 1930. June. Vol. 42. No. 2. pp. 269-277. With 4 figs. on 2 plates. [8 refs.] [Peiping Union Med. College, Peking.]

The authors' experiments showed that when 0.2 to 0.3 cc. of chaulmoogra ethyl esters per kilo, or ten times the usual intravenous dose, although similar to amounts that have been given intramuscularly, are injected intravenously into rabbits they produced embolic obstruction and pulmonary infarcts followed by abscess formation, so if such an intramuscular injection entered a vein the results in man might be serious. Moreover, serial doses similar to those that have been given intravenously in man produced generalized pulmonary fibrosis in rabbits.

L. R.

NOLASCO (J. O.). **Histopathology of Leprosy under Local Infiltration.**—*Jl. Philippine Islands Med. Assoc.* 1929. Oct. Vol. 9. No. 10. pp. 347-357. [12 refs.] [Path. Section, Culion Leper Colony, Philippine Is.]

The histological changes following the infiltration of leprotic tissues by chaulmoogra derivatives is of interest in view of the fact here recorded, that the amount of the remaining pathological material was found to be one-fourth to one-half as great in infiltrated as in un-infiltrated lesions, after ten months such treatment, in spite of intramuscular injection being given in both series. The infiltrated lesions showed much more marked granulation of the lepra bacilli and large mononuclear leucocytes containing yellowish globules, but no proliferation of connective tissue around the lesions. The treatment excites a mild irritant inflammatory reaction.

L. R.

PEIRIER. Les "Caloncoba" à huiles antilépreuses du Cameroun. [**Antileprosy Oils from Caloncoba in Cameroon.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. Jan.-Feb.-Mar. Vol. 28. No. 1. pp. 43-47.

Three varieties of these trees of the Flacourtiaceae order grow in the Cameroons in West Africa, and the oils of two of them, *C. welwitschii* and *C. glauca*, have been shown by analyses given in this paper to form oils in their seeds with very similar chemical and physical properties to chaulmoogra and hydnocarpus oils: it is proposed to try them in the treatment of leprosy.

L. R.

WILLIAMS (A. Winkelried). **Leprosy: Treatment by Means of a Special Vaccine.**—*Arch. Dermat. & Syph.* 1930. July. Vol. 22. No. 1. pp. 109-114. [2 refs.]

The author recalls that in 1914 he reported benefit in the treatment of leprosy by injections of vaccines prepared from sterilized lepra bacilli obtained from nodules of leper patients—after the failure of large doses of chaulmoogra oil orally, which was then the usual treatment.

L. R.

AOKI (T.). Beitrag zur Bedeutung des Jods für Diagnose und Behandlung der Lepra. [**Iodine in the Diagnosis and Treatment of Leprosy.**]—*Japan Jl. Dermat. & Urol.* 1930. Mar. Vol. 30. No. 3. pp. 213-224. [41 refs.] [In Japanese. German summary p. 27.]

The author reports on further trials of 5 per cent. sodium iodide intravenously in leprosy in 61 cases, usually in doses of 1 to 10 cc. These he finds to be of diagnostic value, and also of use in treatment, with favourable results in cases not reacting much; severe reactions may do harm by disseminating the leprosy bacilli. The dosage must be varied according to the nature of the case.

L. R.

LABERNADIE (V.). Échec du traitement de la lèpre par l'iodure de potassium. [**Failure of Treatment of Leprosy by Potassium Iodide.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. Jan.-Feb.-Mar. Vol. 28. No. 1. pp. 54-61.

The author reports a trial of Muir's method of using gradually increasing doses of potassium iodide up to very large ones in 17 cases, and he concludes that lepers often support very large amounts of the drug, but he has not observed any benefit from this form of treatment.

L. R.

PY (C.) & RIVEROS (M.). Tratamiento de las ulceraciones leprosas por la simpatectomia. [**Treatment of Leprotic Ulcers by Sympathectomy.**]—*5a Reunión Soc. Argentina Patol. Regional del Norte, Jujuy, 7 al 10 Octubre, 1929.* Vol. 1. pp. 408-419. With 10 text figs.

Ulcers of the legs and feet of lepers are common, often of large size, run a very chronic course, may be a fruitful source of infection and are usually very slow to heal. The chronicity is probably accounted for by the localization in a part where the skin is ill-nourished, where secondary infection is great and varied, and an ischaemic necrosis may be associated with local arteritis. Judging by the six recorded cases, four of ulcers on the leg and three (one patient had both) of perforating ulcers of the foot, the results of dividing the peri-arterial sympathetic nerves have been astonishing. The following are brief details of each:—

1. Male, 53 years. Leprosy 15 years, ulcer on leg and in sole of foot 6 months (resisting all local and general treatment). After sympathectomy under local novocaine anaesthesia, the leg ulcer cicatrized in 17 days, the perforating ulcer in 33 days.

2. Female, 49 years. Leprosy 16 years; ulcer over external malleolus 10 months and measuring 9 and 8 cm. completely cicatrized in a month after operation.

3. Male, 43 years. Leprosy 8 years, ulcer with elephantoid condition 7 years, 7.5 and 6 cm. The latter condition cleared in 8 days and the ulcer healed in 22 days.

4. Male, 25 years. Leprosy 8 years. On right leg almost encircling the limb, 22 and 12 cm., and on the left leg one measuring 12.5 and 6 cm. The latter cicatrized in 12 days. In the case of the former the vessel was wounded and the femoral had to be ligatured.

5. Male, 35 years. Leprosy 8 years; perforating plantar ulcer 4 cm. diameter cicatrized in a month.

6. Patient of 43 years. Leprosy 9 years; perforating ulcer 2.5 cm. diameter healed in 35 days.

Photographs showing the condition before and after operation in three of these patients are given.

H. H. S.

LANG (Milton C.). **A Note on the Local Treatment of Leprous Ulcers.**—*Indian Med. Gaz.* 1930. May. Vol. 65. No. 5. pp. 274-275.

The author reports on the value of iodoform in the treatment of leprous ulcers, after trimming away dead or hardened flesh and applying

silver nitrate stick to indolent surfaces, opening up sinuses and removing dead bone, and he advises either 16 grains to an ounce of acetone or a 10 per cent. solution in eucalyptus oil applied locally on cotton wool.

L. R.

CUMMINS (S. Lyle) & LE ROUX (J. J. du Pré). **Intradermal Tests with Extract of Leprous Skin in Cases of Leprosy and in Non-Lepers.**—*Tubercle*. 1930. Apr. Vol. 11. No. 7. pp. 299–303. With 2 figs. [1 ref.]

The fact that 70 per cent. of native recruits for the South African mines give positive reactions with tuberculin, yet are very susceptible to tuberculosis, raised the question whether some of the positive reactions may be due to latent infections with leprosy, since cases of that disease also react to tuberculin. To test this, Professor Lyle Cummins, during a recent visit to South Africa, carried out inoculations with leprolin supplied by MUIR from Calcutta, but no confirmation of the presence of latent leprosy was obtained. Tests in definite lepers showed that maculo-anaesthetic cases reacted more strongly than nodular cases, but the results were somewhat irregular, although the tests indicate that the reactions in lepers are specific, since they are more frequent and more marked than in the non-lepers.

L. R.

BLANC (Georges), JOANNIDÈS (G.) & PANGALOS (G. C.). La réaction de fixation du complément appliquée au séro-diagnostic de la lèpre avec un antigène méthylique de bacille de Kedrowsky. [**Complement Fixation in Diagnosis of Leprosy.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 568–574. [2 refs.] [Pasteur Inst., Athens.]

After referring to some previous work on the subject, the authors give full details of complement deviation tests they have carried out with methylic antigen made with the bacillus of Kedrowsky, with positive results in all of 12 nodular cases, and also in 5 out of 7 macular cases, and in 3 of 5 nerve cases. These figures are much higher than the reactions obtained with syphilitic and tubercular antigens, and the Kedrowsky antigen did not give positive reactions in diseases other than leprosy. This does not, however, allow of the conclusion that the Kedrowsky bacillus is the cause of leprosy.

L. R.

GOMES (J. M.) & ANTUNES (P. C. de Azevedo). Descio do complemento na lepra com o streptothrix leproide de Deycke desengordurado. Sensibilização dos pacientes e esta reacção pela administração de iodeto de potássio.—*Brasil-Médico*. 1930. Apr. 26. Vol. 44. No. 17. pp. 464–468. French summary.

— & —. La séro-réaction dans la lepre avec le *Streptothrix leproïdes* de Deycke, dégraissé. Sensibilisation au moyen de l'iodure de potassium. [**Sero-reaction with Streptothrix leproïdes.**]—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1317–1318.

During the last three years the authors have used a serum reaction with defatted *Streptothrix leproïdes* of Deycke as a diagnostic measure

with good results in many cases, and they now state that sera taken at least a week after a dose of potassium iodide may give positive reactions in cases previously negative; but further work is required on this subject.

L. R.

AMIES (C. Russell). **The Rubino Reaction in Leprosy.**—*Bull. Inst. Med. Res. Federated Malay States.* 1929. No. 4. 16 pp. [32 refs.]

After dealing with the earlier literature, the author describes his own technique as follows :—

Sheep's blood corpuscles are obtained pure by repeated saline washing of defibrinated blood with the aid of the centrifuge, and treated with 6 per cent. formaldehyde brought to a hydrogen concentration of pH 7·4 with N/10 sodium hydroxide solution to preserve them, again washed in saline, and the original volume of blood obtained by adding saline and then preserved in the ice chest. Add 0·3 cc. of sheep's corpuscles to 1 cc. of the patient's serum in a small test tube, shake and place in incubator at 37° C., and note the degree of sedimentation at half-hour intervals. Complete sedimentation in half an hour is a positive reaction.

In 287 controls only 9 cases of typhus, 2 of pregnancy and 5 of various diseases were positive, whereas among 95 active leprosy cases 87 were positive, but none of 126 inactive cases; so that the test is of little diagnostic value, but of much help as a guide to treatment, in the same way that the simple sedimentation test of the patient's blood is, since a positive reaction indicates a rest from injections of active drugs. Evidence is given to show that the positive reactions are due to an excess of globulin in the blood, and the contention of MARCHOUX and CARO that the reaction is due to a specific substance in the blood is disproved, for, contrary to their statement, heating the serum to 56° to 60° C. did not affect the result. The exact degree of pH is immaterial. The sera can be sent to a distant laboratory for Rubino's test.

L. R.

PEZZI (Giuseppe). L'albumino-reazione del muco nasale e la puntura delle ghiandole per la diagnosi precoce della lebbra. [**The Albumin Reaction in the Nasal Mucus and the Value of Gland Puncture in the Early Diagnosis of Leprosy.**]—*Ann. di Med. Nav. e Colon.* 1930. Mar.-Apr. Year 36. Vol. 1. No. 3/4. pp. 145-166. [2 pages of refs.]

In testing qualitatively for albumen in the nasal mucus the author used Tarchetti's modification of Boedeker's reaction [one of those employing dilute acetic acid and potassium ferrocyanide]; for quantitative estimation, Kjeldahl's method. Thirty-two leper patients were examined, 19 of the nodular form, 7 of the anaesthetic, and 6 mixed. The disease had existed from 7 months to 8 years in the first, 2 to 17 years in the second and 2 to 10 in the third. In all but 2, anaesthetic cases, albumen was present, varying between a minimum of 1·50 and a maximum of 16 per 1,000. Of 21 controls, 7 syphilitics and 7 tuberculous, 7 suffering from other conditions such as leukaemia, carcinoma of stomach, lupus erythematosus, all were negative to the test except 1 case of lupus vulgaris. In short, the albumen reaction was constant in the nodular form, and most marked in the florid stage, less in degree in the mixed, least in the anaesthetic. The intensity of the reaction was found to be greatest in the earlier stages.

Gland puncture was performed on the same 32 lepers and the juice examined for Hansen's bacilli. Ten of the 19 nodular cases, 3 of the 6 mixed, but only 1 of the 7 anaesthetic were positive.

Lastly, both tests were made on 14 suspects or possible cases who had been in contact with leper patients, but who themselves presented no signs of disease. Nine gave a positive albumen reaction, from 1·2 to 15 per 1,000, and 2 revealed the bacilli in gland juice.

H. H. S.

SONNENSCHN (Curt). Kultur von Leprabakterien auf Glycerin-Ei- und Malachitgrün-Ei-Nährboden. [**Culture of Leprosy Bacilli.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. June 26. Vol. 117. No. 4/5. pp. 284–286. [10 refs.] [Hyg. Inst., Univ., Cologne.]

The author reports making cultures from a piece of leprous skin containing scanty lepra bacilli upon a tubercle bacillus malachite green-glycerine-egg medium, on which after 2 months at 37° C. a slight increase of the leprosy bacilli could be demonstrated. A sub-culture after 2½ months gave a greater increase of the organisms, but subsequently the second generation ceased to thrive and underwent slow degenerative changes.

L. R.

MUIR (E.). **The Supposed Cultivation of the Organisms of Human and Rat Leprosy.**—*Jl. Preventive Med.* 1930. July. Vol. 4. No. 4. pp. 331–335. [2 refs.] [School of Trop. Med. & Hyg., Calcutta.]

WALKER (Ernest Linwood). **Rejoinder.**—*Ibid.* pp. 335–336. [George Williams Hooper Foundation for Med. Research, Univ. of California, San Francisco.]

This paper is a criticism of two papers by WALKER & SWEENEY [this *Bulletin*, Vol. 26, p. 1032; 1040]. Information is asked regarding the precautions those authors took to avoid the errors of their predecessors in mistaking saprophytic skin diphtheroids, etc., for the leprosy bacillus through insufficient sterilization of the skin. A brief answer avoids answering this pertinent question by stating, "we consider ours (technique) was as adequate as is practicable."

L. R.

HU (Ch'uan-ku'ei) & MU (Jui-wu). **Demonstration of *Bacillus leprae* by Means of Cantharides Plaster and Carbon Dioxide Snow.**—*Nat. Med. Jl. China.* 1930. Apr.–June. Vol. 16. No. 2/3. pp. 177–181. [3 refs.] [Peiping Union Med. College, Peking.]

The authors describe a method of demonstrating lepra bacilli in skin lesions by the application over cutaneous lesions of cantharides plaster 0·5 cm. square, or the point of a stick of carbon dioxide snow for about one minute to produce blisters. These are opened after ten hours and the contents stained. Among 13 cases the first method gave positive results in 7 and the second in 9, against 9 and 10 respectively on examining the juice of the lesions or excised pieces. They think the blister method is of value when a patient objects to the other procedures.

L. R.

MORALES-OTERO (P.) & HERNANDEZ (L. G.). II. **Studies of the Blood Chemistry of Leprosy. Analysis of Findings of Fifty Cases.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1930. June. Vol. 5. No. 4. pp. 443-451. [14 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

A study of the blood chemistry in fifty cases of leprosy showed very little, if any, variation in the concentration of serum calcium, blood chlorides, or phosphorus, regardless of the type, extent, or duration of the disease. Cholesterol was slightly reduced below the normal in leprosy, but in lepers treated by ethyl esters it was slightly higher than in untreated cases.

L. R.

MASSIAS (Charles). Formule h mo-leucocytaire de la l pre :  osinophilie dans la l pre   l sions t gumentaires pr dominantes. [**Leucocyte Formula in Leprosy. Eosinophilia in Skin Cases.**]—*C.R. Soc. Biol.* 1930. June 13. Vol. 104. No. 20. pp. 547-548.

The eosinophile leucocytes are moderately increased to 3 to 6 per cent. in early skin cases of leprosy, and to a greater extent, 13 to 18 per cent., in nodular cases, but they are normal or few in nerve cases. Mononuclear leucocytes are increased to a variable extent in the nodular lesions.

L. R.

WEIDEMANN (M.). Zur Verteilung der Blutgruppen bei den Lepr sen Lettlands. [**Blood Grouping in Lepers in Latvia.**]—*Med. Klin.* 1930. Aug. 1. Vol. 26. No. 31 (1338). p. 1155. [2 refs.] [Inst. of Forensic Med., Latvian Univ., Riga.]

Further work has confirmed the conclusions of Weidemann and KAKTIN that there is no relationship between particular blood groups and increased leprosy incidence, but there appears to be some degree of increased susceptibility of certain races to the disease, as most cases come from areas of coastland inhabited by a particular stock.

L. R.

TISSEUIL (J.). Sur l'origine de la l pre en Nouvelle-Cal donie. [**Origin of Leprosy in New Caledonia.**]—*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 357-363. [1 ref.] [Gaston Bourret Inst., Noumea, New Caledonia.]

This oft-told tale is recorded by quotations from previous reports.

L. R.

TISSEUIL (J.). Camouflage des sympt mes de l pre par les indig nes. [**Concealment of Signs of Leprosy by Natives.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 574-576.

Natives know leprosy signs well, but they sometimes hide them by powdering their noses and facial skin lesions, or applying coal tar to their body, and they falsely attribute nerve lesions to scars they frequently suffer from.

L. R.

BRUG (S. L.), HAGA (J.), VAN JOOST (R. P. A. C.) & VERBUNT (J. A. M.). **Scabies crustosa s. Norvegica.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1930. June 1. Vol. 70. No. 6. pp. 576–587. With 5 figs. on 2 plates & 1 text fig. [14 refs.]

A Chinese of about 50, suffering from the anaesthetic type of leprosy, was also infected with scabies which showed in this case the typical picture of scabies crustosa. The patient died during a salicyl-sulphur cure, after an apparent preliminary success. The post-mortem examination confirmed the diagnosis. *Sarcoptes scabiei* was found (*in vivo*) in great abundance.

W. J. Bais.

- i. VIGNE (Paul). Lèpre maculeuse. Léprides folliculaires tuberculoides. Cas de contagion en France par lèpre importée. [**Follicular Tuberculoid Leprosy.**]—*Bull. Soc. Française Dermat. et Syph.* 1930. May. No. 5. pp. 596–606. With 5 text figs. [1 ref.]
- ii. MESSIMY (R.). A propos de quelques cas de lèpre, observés au Maroc, dans la région de Marrakech. [**Leprosy in Morocco.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 600–618. With 2 text figs. [4 refs.]

i. An account of a case of the follicular tuberculoid type of leprosy with an illustration of the tubercle-like lesions found microscopically.

ii. A brief account of some cases of leprosy seen in Morocco.

L. R.

COCHRANE (R. G.). **Classification and Routine Treatment of Leprosy.**—*Kenya & East African Med. Jl.* 1930. July. Vol. 7. No. 4. pp. 100–107. With 1 text fig.

A brief account of the generally used methods of treatment.

L. R.

LABERNADIE (V.) & SRINIVASSANE. Bons effets de l'huile d'*Hydnocarpus Wightiana* dans le traitement de la lèpre. [**Good Effects of Hydnocarpus Oil in Treatment of Leprosy.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. Jan.–Feb.–Mar. Vol. 28. No. 1. pp. 62–69. [1 ref.]

The authors report favourable results in 150 cases of leprosy from injections of *H. wightiana* oil prepared at Pondichéry on the lines of MUIR's work in Calcutta; notes of some of the cases are recorded.

L. R.

AUBIN (H.). Essai de traitement de la lèpre par les sels d'or. [**Treatment of Leprosy by Gold Salts.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 693–696.

This is a short paper indicating some benefit from injections of gold preparations in leprosy.

L. R.

TROPICAL OPHTHALMOLOGY :

A REVIEW OF RECENT ARTICLES.—XIV.*

EYELIDS.—CRUICKSHANK¹ describes a successful operation for the relief of *symblepharon*. The band of tissue stretched from the inner canthus to an attachment on the cornea and interfered with the movements of the lids and eyeball. The band was dissected from the underlying tissues and bisected horizontally. A mucous membrane graft, 22 mm. by 10 mm., taken from the lip, was then stitched in place over the bare area, whilst the band was utilized to deepen the fornices. The writer stresses the importance of making the graft as thin as possible. This is effected by laying it raw surface upwards on the pulp of the left forefinger and removing all fat, etc., with fine scissors.

CONJUNCTIVA.—CHESNEAU² finds that diseases of the eye account for 10 per cent. of outpatient consultations in Cammon. Diplo-bacillary infections are the most numerous (41 per cent.), whilst Koch-Weeks inflammations amount to 29 per cent. These diseases are unaccompanied by serious complications. Laos was free from trachoma until it became infected by Annamite immigrants. (The author reaffirms this statement in another paper.³) There is some extension of the disease in districts where the inhabitants are in contact with these Annamites. From March to June is the season in which these conjunctival troubles are particularly rife. The statistics show comparatively little gonorrhoeal ophthalmia (2 per cent.) ; but the author points out that this is deceptive since the figures only deal with the milder forms of disease, such as are easily treated in the outpatient department. MULDOON⁴ has reviewed the diseases of the eye met with in Honduras. Acute catarrhal conjunctivitis is the principal cause of disability, the Koch-Weeks being the most common causative organism. Only five cases of trachoma were treated ; the disease is seldom seen except among Syrian immigrants. Of 438 patients, 57 suffered from pterygium and 6 from detachment of the retina.

CLOITRE⁵ has found Koch-Weeks catarrh to be the commonest conjunctival affection in South Madagascar. Morax-Axenfeld infections are fewer, whilst trachoma is very rare. He has recently observed a form of follicular conjunctivitis in five patients. In one of these the follicles were distributed over the conjunctiva of both lids, the globe and the plica semilunaris. The elevations tended to be arranged in regular lines and pannus was absent. The follicles were composed of varying sized clusters of lymphocytes in a fine fibrillar

* For the thirteenth of this series see Vol. 27, pp. 501-507.

¹ CRUICKSHANK (M. M.). Restoration of the Conjunctival Cul-de-Sac in a Case of Extensive Posterior Symblepharon.—*Indian Med. Gaz.* 1930. July. Vol. 65. No. 7. pp. 392-393. With 1 text fig.

² CHESNEAU (Pierre). Les conjonctivites infectieuses au Cammon, Province du Moyen-Laos.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1929. Oct. Vol. 7. No. 10. pp. 514-522. With 2 charts.

³ CHESNEAU (Pierre). La trachome au Cammon (province du Moyen-Laos).—*Bull. Soc. Méd.-Chirurg. Indochine.* 1930. May. Vol. 8. No. 5. pp. 396-405. With 1 map & 1 graph in text.

⁴ MULDOON (W. E.). Diseases of the Eye in Honduras.—*Eighteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1929. pp. 264-271.

⁵ CLOITRE (J.). Note sur une cause de cécité assez fréquemment observée chez les Malgaches.—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 254-255.

network. The patients complained of slight photophobia and a sensation of a foreign body in the eye; a low degree of conjunctival hyperaemia was present. The trouble lasted for twelve or fifteen months, and was but little affected by any treatment.

Trachoma.—In view of the rather differing opinions regarding the specific nature in trachoma of the organism described by NOGUCHI as *Bact. granulosis*, the findings of LUMBROSO⁶ are interesting. He states that he succeeded in isolating a similar micro-organism from five out of seven cases of untreated trachoma in Tunis. Inoculation of the culture produced granular conjunctival changes in a previously healthy baboon. Lumbroso considers that his investigations, though not convincing, are in favour of Noguchi's claims. TANG⁷, however, has attempted to cultivate the bacillus from material obtained from 25 cases of typical trachoma, and was only once able to isolate an organism like that described; even this one was atypical and failed to cause any lesion when inoculated on rabbits and monkeys. LABERNADIE and GOVINDARAJASSAMY⁸ report a very favourable experience of chaulmoogra oil as a local application. The affected membrane is scrubbed with absorbent wool which has been mounted on a glass rod and thoroughly saturated with the drug. Sufficient force is used to rub the follicles from the conjunctiva. This grattage is repeated daily for a week or so. [It does not seem easy to estimate how much credit for a good result should be assigned to the chaulmoogra oil and how much to the grattage.] AYUYAO⁹ has found tattooing of the conjunctiva with 25 per cent. solution of acetic acid successful in treating the disease amongst the Filipinos. He uses a solution of acetic acid 25 per cent., sodium bicarbonate 2 per cent., and cocaine 5 to 10 per cent. The conjunctiva is washed and anaesthetized and all the follicles are then pricked with a tattooing needle dipped in the solution. During the proceeding an assistant continuously drops a solution of bicarbonate of soda into the eye in order to protect the cornea against the action of the acid. The author has never encountered a severe case of the disease in the Philippines, and the follicular type is practically the only one seen. RAGAIN¹⁰ eulogizes the use of diathermy in the treatment of trachoma. He employs fulguration and makes very short applications of one-fifth of a second. Some transitory pain is experienced, and a rather marked local reaction, which subsides in two or three days, occurs. A superficial eschar is produced and this separates about the third day. Cicatrization is completed by the

⁶ LUMBROSO (Ugo). Nouvelles recherches sur l'étiologie du trachome. Etude d'un germe, rencontré en Tunisie, dans ses rapports avec le *Bacterium granulorum* de Noguchi.—*C.R. Acad. Sci.* 1930. Apr. 28. Vol. 190. No. 17. pp. 1026-1028.

⁷ TANG (F. F.). An Attempt to isolate *Bacterium granulosis* Noguchi from Cases of Trachoma.—*Nat. Med. J. China.* 1930. Feb. Vol. 16. No. 1. pp. 68-74. [6 refs.] [Med. College, National Central Univ., Woosung, Shanghai.]

⁸ LABERNADIE (V.) & GOVINDARAJASSAMY. Utilisation de l'huile d' "Hydnocarpus Wightiana" pour le traitement du trachome.—*Ann. de Méd. et de Pharm. Colon.* 1930. Jan.-Feb.-Mar. Vol. 28. No. 1. pp. 69-71. [1 ref.]

⁹ AYUYAO (Conrado D.). Acetic Acid in the Treatment of Trachoma.—*Jl. Philippine Islands Med. Assoc.* 1930. Mar. Vol. 10. No. 3. pp. 129-131. [1 ref.] [Med. College, Univ. of the Philippines, Manila.]

¹⁰ RAGAIN. Traitement du trachome par étincelage de tension (fulguratio monopolaire).—*Bull. Soc. Méd.-Chirurg. Indochine.* 1930. May. Vol. 8. No. 5. pp. 419-433.

twelfth day, and, if any trachomatous areas persist, the treatment may then be repeated. Pannus is specially benefited. Other forms of local and constitutional treatment should also be employed.

The numbers of the *Revue du Trachome* for January, April and July, 1930, prove the serious attention now devoted to trachoma in France and in the French colonies. NICOLLE¹¹ states his conviction that all kinds of monkeys other than the Algerian baboon (*Macacus inuus*) are unsuitable for inoculation experiments owing to their liability to contract a granular form of conjunctival inflammation after a simple scarification of the conjunctiva. MORAX¹² concludes that the *Bact. granulosis* described by Noguchi does not appear to be the causative organism in trachoma. AUBARET¹³ admits that many cases of spontaneous cure may occur in districts where the disease is rife, but does not regard this as constituting a reason for any diminution in active measures against trachoma in such places. ZACHERT¹⁴ describes the steps taken in Poland to combat the disease. Thanks to these measures the number affected is much diminished and there is ground for hoping that the scourge may in time disappear from the country. TRAPESONTZEWA¹⁵ states her conviction that trachoma may be contracted in adult life and not in childhood only. [To English surgeons this assertion seems unnecessary.] The same observer¹⁶ inoculated six human subjects with filtered material obtained from many different patients suffering from undoubted trachoma. In no case did the filtered virus give rise to more than a mild transient inflammation. She therefore concludes that the cause of trachoma is a non-filtering virus. TALBOT¹⁷ argues that trachoma was introduced into Italy in the thirteenth century by the Crusaders. St. Francis of Assisi was a prominent sufferer from the disease. SÉDAN¹⁸ records three instances in which the instillation of eserine for glaucoma appeared to cause a recrudescence of trachoma in patients whose conjunctival disease was previously quiescent. He recognizes the fact that eserine is capable of lighting up a follicular inflammation, but regards these cases as being true trachoma. The periodicals also contain many papers which record the incidence of the disease in the French colonies.

11 NICOLLE (Charles). Sur les conjonctivites naturelles (granuleuses et folliculaires) des singes inférieurs et leur non identité avec le trachome.—*Rev. Internat. du Trachome*. 1930. Jan. Vol. 7. No. 1. pp. 1-2.

12 MORAX (V.). Le bactérium granulosis et le trachome.—*Rev. Internat. du Trachome*. 1930. Jan. Vol. 7. No. 1. pp. 2-6.

13 AUBARET. Notes sur les cas d'amélioration et de guérison spontanées du trachome.—*Rev. Internat. du Trachome*. 1930. Jan. Vol. 7. No. 1. pp. 6-12.

14 ZACHERT (M.). L'organisation de la lutte contre le trachome en Pologne.—*Rev. Internat. du Trachome*. 1930. Jan. Vol. 7. No. 1. pp. 19-23. [4 refs.]

15 TRAPESONTZEWA (C.). De la contamination de l'adulte. (Réponse à M. Canis).—*Rev. Internat. du Trachome*. 1930. Jan. Vol. 7. No. 1. pp. 23-28.

16 TRAPESONTZEWA (C.). Le virus du trachome, est-il un virus filtrant?—*Rev. Internat. du Trachome*. 1930. Apr. Vol. 7. No. 2. pp. 65-71.

17 TALBOT. Trachome importé d'Egypte en Italie dès le XIII^e siècle.—*Rev. Internat. du Trachome*. 1930. Apr. Vol. 7. No. 2. pp. 112-114. [1 ref.]

18 SÉDAN (Jean). Réveils trachomateux d'origine éserinique.—*Rev. Internat. du Trachome*. 1930. July. Vol. 7. No. 3. pp. 152-155.

CORNEA.—*Superficial Punctate Keratitis.*—WRIGHT¹⁹ has recorded his observations on superficial punctate keratitis in a paper which he submitted to the 13th International Congress of Ophthalmology. Various epidemics of the disease have been reported from time to time in Bombay and Madras. In 1928 and in the beginning of 1929 the disease became very rife in Southern India and 923 cases were treated at the Madras Government Ophthalmic Hospital. [Superficial punctate keratitis is somewhat a misnomer, since in a very large number of cases the most noticeable lesion lies in the substantia propria of the cornea and is of considerable size.] Even in the mildest types of the disease there was nearly always to be found some trace of deposit on the endothelium of Descemet's membrane; and the deep layer of the cornea sometimes showed folding with large pigmented deposits. Wright was often able to observe a preliminary stage of slight conjunctival hyperaemia. This, in rare cases, became extreme and was associated with oedema of the lids and chemosis. The author was able to reproduce the disease by the direct inoculation of unfiltered suspension of infected epithelium in three out of seven human subjects, and by the inoculation of a filtered suspension in five out of eleven. The average patient improved rapidly when the eye was kept covered with a moist boric pad under an eye shade, or bandage, and treated with dionine drops twice daily and atropine ointment at night. The most prolonged lesions were seen in patients who had not kept the eye occluded from the commencement of the attack. The prognosis may be regarded as being very good.

UVEA.—CLOITRE²⁰ notes that a chronic type of syphilitic iritis is common in Madagascar. The acute form of the disease is remarkably rare; but this chronic and insidious variety is fairly common. It takes two or three years to run its course and ends in occlusion of the pupil. It is often mistaken for cataract by those who are unskilled.

LENS.—*Cataract.*—CARGILL'S²¹ paper on the treatment of incipient cataract contains much that will prove useful to surgeons working in the Tropics, though he mainly considers the subject from the European standpoint. He mentions, without much enthusiasm, various forms of local treatment, and discusses the more valuable method of searching for a constitutional defect likely to influence lens nutrition and directing treatment towards this. Endocrine deficiency, especially hypothyroidism, may be a factor and it is of the highest importance to eliminate chronic toxæmias. Teeth, tonsils, sinuses, the gastro-intestinal and genito-urinary tracts should all be passed in review. He wisely insists that a patient suffering from early but slowly progressive opacities of the lens should never be subjected to the shock of the bald statement that he has "cataract." A cheerful optimism should be cultivated, and it is sufficient to tell him that he has some "flaws" in his lens. ANKLESARIA²² advocates the use of a bridge-flap in cataract extraction. He

¹⁹ WRIGHT (R. E.) et al. Superficial Punctate Keratitis.—*Brit. Jl. Ophthalm.* 1930. June. Vol. 14. No. 6. pp. 257-291. With 1 text fig.

²⁰ CLOITRE (J.). Note sur la conjonctivite folliculaire dans le sud de Madagascar.—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 255-256. [Fianarantsoa Hosp., Fianarantsoa.]

²¹ CARGILL (L. Vernon). The Management and Treatment of Incipient Cataract.—*Brit. Med. Jl.* 1930. Sept. 13. pp. 419-421. [12 refs.]

²² ANKLESARIA (M. D.). Some Safeguards and Points of Technique in the Extraction of Senile Cataract with Capsulotomy.—*Indian Med. Gaz.* 1930. Feb. Vol. 65. No. 2. pp. 67-71.

considers that the flap may render delivery of the lens a little more difficult, but the bridge should be of a good length. It is highly important, too, to make the section sufficiently large. He finds that bleeding from the flap can be controlled by the addition of adrenaline to the cocaine. Capsulotomy is performed with forceps and delivery of the nucleus is aided by impaling it upon the point of the knife. Cortical remnants are irrigated from the chamber. Any constitutional defect is treated before operation is undertaken and all local sepsis is eliminated. Herbert's method of perchloride of mercury irrigation is employed, and orbicular paresis is induced by Van Lint's technique.

Glaucoma.—FERGUSON²³ states that in Nigeria glaucoma attacks Africans at a comparatively early age. He remarks that the patients practically always have a history of untreated yaws. The disease is usually of a chronic type, but subacute exacerbations also occur. WADIA²⁴ reports a case of recovery of vision in an eye which had been blind from glaucoma for eight months. He performed a successful trephining operation. The patient was a woman aged 49, and the glaucoma had developed after an attack of "beriberi." [The reviewer, when in Madras, found it worth while to trephine blind patients if they had been able to find their way about without guidance three months previously.]

HERBERT²⁵ argues that iridencleisis, or iris-inclusion, is the best operative treatment for glaucoma. He modifies the ordinary operation by causing a small irido-dialysis, tearing a small portion of the iris from its attachment, and claims that this procedure induces a localized development of fibrous tissue in the conjunctiva covering the iris prolapse. This new-formed fibrous tissue acts as a shield, yet it does not interfere with efficient drainage of the aqueous into the surrounding sub-conjunctival tissue. He describes his technique as follows:—

"The edge of the ordinary pattern bent keratome (small blade preferred) pushes the conjunctiva from a point 6–7 mm. from the corneal margin down nearly to the corneal margin, the exact point depending on the varying degree of overlapping of the cornea by the conjunctival limbus. The knife point is pushed on into the anterior chamber, at first inclined somewhat towards the iris, very slowly and preferably with side-to-side movements, till the exact size wanted at the deep surface of the cornea is judged to have been produced. The ordinary pattern of bent iris forceps is easily introduced through the subconjunctival passage and so into the chamber. The points of very fine forceps are apt to be caught repeatedly in the conjunctival tissue. The iris is well gripped and pulled slowly towards the centre of the pupil, till it is seen to have been torn from its base locally. There is no bleeding from the torn iris. It is then drawn through the sclero-corneal wound, to be cut radially under the conjunctiva. Straight iris scissors are the more convenient for this. If de Wecker's scissors are used, short-bladed ones are the best. Repeated snips are made because the effect cannot be seen sufficiently, often being hidden by blood or uveal pigment under the conjunctiva. It is not quite essential that the cut should reach the pupillary border, though this is aimed at. The iris is not released from the grip of the forceps until the cutting is completed."

The author recognizes that sympathetic ophthalmitis may follow an operation in which the uvea remains prolapsed. But he claims to

²³ FERGUSON (H. R. M.). Primary Chronic Glaucoma as met with at Port Harcourt, Nigeria.—*West African Med. Jl.* Lagos. 1930. Jan. Vol. 3. No. 3. p. 59.

²⁴ WADIA (B. K.). Recovery of Sight in a Blind Glaucoma Case.—*Calcutta Med. Jl.* 1930. Aug. Vol. 25. No. 2. pp. 82–84.

²⁵ HERBERT (H.). The Future of Iris-Inclusion in Glaucoma.—*Brit. Jl. Ophthalm.* 1930. Sept. Vol. 14. No. 9. pp. 433–448.

have eliminated this danger by careful preliminary disinfection of the conjunctiva. He uses his well-known irrigation of 1-3000 perchloride of mercury lotion. This is carried out for at least two minutes, and should be completed a full twenty minutes before the commencement of the operation. A secretion of mucus from the surface of the membrane is the sign that the irrigation has been sufficient. All minor precautions against infection are also adopted. Meiotics are omitted for sixteen hours before operation as it is desirable that the pupil should be dilated when operating; adrenaline instillations are usually effective in securing this dilatation.

RETINA.—*Detachment of the Retina.*—Retinal detachment is one of the greatest tragedies encountered by the ophthalmologist, and ORMOND²⁶ has performed a valuable service in rendering recent views and information on the subject easily accessible to the practitioner. He has placed on record the theories advanced by GONIN and the treatment adopted by that surgeon. This observer believes that detachment of the retina only occurs if a tear or hole exists in the membrane, and that this hole allows the liquid vitreous to pass through it and so raise the retina from its bed on the pigment epithelium. In recent cases such tears are usually situated on the convexity of the detachment, but later, when the fluid alters its position, they may be found at other parts. The region of the ora serrata, owing to the thinness of the retinal layer in that area, is a favourite site. When placed posterior to the equator holes are more often the result of previous pathological changes or of trauma. Treatment is directed to the closure of the retinal hole. This is effected by incising the sclera over the hole and introducing a glowing cautery after allowing the subretinal fluid to escape. It is essential to locate accurately the hole and to operate in such a way as to insure its closure. GONIN furnishes minute directions as to how this may be best effected.

GENERAL DISEASES. *Leprosy.*—HOFFMANN²⁷ enthusiastically recommends the use of gold salts in the treatment of ocular leprosy. He has used krysolgan and solganol in particular. The preparation can be injected intravenously or subcutaneously. Increasing doses are given in a series of eight injections, one every five to eight days.

Sparganosis.—The irritating and dangerous character of many of the eye remedies used by vaidyans and quacks in tropical countries is painfully familiar; but one would regard the use of portions of a dismembered frog as an application to the eye as being comparatively innocuous. MOTAIS²⁸ has, however, found that the treatment is a frequent cause of sparganosis in Indo-China. The predilection of the parasites for the malar and orbital regions is explained by the practice.

The Annual Report of the Madras Ophthalmic Hospital²⁹ is, as usual, interesting reading. Senile cataract accounted for 1,612 of the

²⁶ ORMOND (Arthur W.). Spontaneous Detachment of the Retina.—*Brit. Med. J.* 1930. May 24. pp. 940-941. [1 ref.]

²⁷ HOFFMANN (W. H.). Gold Treatment of Eye Affections in Leprosy.—*Jl. Trop. Med. & Hyg.* 1930. Aug. 15. Vol. 33. No. 16. pp. 233-236. [Finlay Inst., Havana, Cuba.]

²⁸ MOTAIS (F.). Considération sur la pathogénie de la sparganose oculaire.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1929. July. Vol. 7. No. 7. pp. 363-368.

²⁹ MADRAS. Administration Report, Statistics and Professional Report of the Govt. Ophthalmic Hospital, Madras, for 1929 [WRIGHT (R. E.)].—43 pp. With 1 chart & 6 figs. on 2 plates. 1930. Madras. Govt. Press. [1 rupee, 8 annas.]

3,152 operations performed upon in-patients. The "bridge-flap" has now been adopted with satisfactory results. Barraquer's operation is reserved for uncomplicated immature cataracts. O'Brien's method of inducing seventh nerve paresis by the injection of novocaine and adrenaline in the neighbourhood of the mandibular joint is now employed. WRIGHT observes that "when the cataract has been extracted and the lips of the section are lying in apposition, actual movements of the recti muscles do not appear to have as much influence as one might suppose in causing the section to gape under the thrust of the contents of the posterior segment. It is the sudden initiation of such movement that appears to cause the section to gape." (The most important factor in the production of such gaping and consequent vitreous loss is probably a contraction of the orbicularis, which, when the eyelids are fixed by a speculum, drags the levator palpebrae forward and causes the belly of that muscle to press upon the deep portion of the globe.) Remarks regarding the epidemic of superficial punctate keratitis (already referred to in this article) occupy some pages of the report. The epidemic was a very considerable one and accounted for nearly 3,000 admissions to the outpatient department. Amongst the interesting cases recorded is that of a man aged 25 who developed quinine amblyopia as the result of quinine administered in medicinal doses for a long-standing benign tertian infection. Treatment was a difficult problem as the patient was cachectic and suffering severely from malaria. General constitutional treatment, however, so improved his condition that he was able to tolerate intravenous injections of quinine without ocular damage and eventually to become free from parasites. On leaving hospital he had good central vision but a marked contraction of his visual fields. It is reaffirmed that keratomalacia may possibly be considered to be the most serious cause of preventable blindness amongst children in Madras, and it is in any case a more serious one than ophthalmia neonatorum. Radium was used in the treatment of various conditions. Round cell sarcoma, chloroma, and lymphoblastoma responded well, as also did rhinosporeidum; but spring catarrh did not benefit, whilst trachoma appeared to be rendered worse.

H. Kirkpatrick.

SPRUE.

MANSON-BAHR (Philip) & WILLOUGHBY (Hugh). Studies on Sprue with Special Reference to Treatment. Based upon an Analysis of 200 Cases.—Reprinted from *Quarterly Jl. Med.* 1930. July. Vol. 23. No. 92. pp. 411–442. With 9 figs. (7 on 3 plates) & 5 graphs. [18 refs.] [Hosp. for Trop. Diseases, London.]

The authors analyse 200 cases of sprue observed by one or other over a period of ten years. They note the rarity of cases outside India, China and Ceylon, but mention one from Nyasaland and another from Mauritius. [Cases do occur elsewhere, but apparently they have not come within the authors' purview.] Stress is duly laid on the fact that many patients suffer for years from manifestations of sprue without their true import being recognized, and also that there may be a latent period of 6 to 8 years' residence in Europe before the onset of recognizable symptoms. [In view of these two propositions it is not quite clear what the authors mean by the statement "Sprue has a definite incubation period."] An analysis of special symptoms, largely from the clinical aspect, is presented, including the physical signs in the abdomen, the blood changes, the presence of cramps and tetany, the occasional pyrexia and the invariable emaciation. The major part is devoted to treatment; the various changes of treatment which have been in vogue during the last 20 years are reviewed, from the plain milk of Sir Patrick MANSON's day giving place to the Salisbury diet; the Begg treatment by santonin, which to be effectual must itself have undertaken the journey to a sprue country; next the strawberry and fruit cure, through papaw and raw meat to the more modern liver soups and extracts, calcium and parathyroid, blood transfusion and high protein.

From the medicinal aspect the general use of calcium is noted, in the form of Pulv. Bataviae Co., Peter Sys's powder, kaolin, etc., and the use of dilute HCl if there is hypochlorhydria. The combination with parathyroid preparations for regulating the calcium metabolism was tried by the authors in 137 cases. Though they have "seen no deleterious effects attributable to this form of treatment" they state that after its use "more than one relapse of acute symptoms occurred. In one instance it did not prevent a fatal issue to the disease, and we have had experience of some six cases where clinical improvement took place immediately the calcium lactate and parathyroid ceased to be given" (p. 436). The fatality of the whole series was only 1.5 per cent. The differential diagnosis from chronic pancreatitis, Addisonian anaemia, coeliac disease, and stomatitis of streptococcal origin is briefly discussed, and the paper closes with advice on after-treatment and care in sprue cases. Appended to the letterpress are three plates of photographs showing the glazed condition of the tongue, the abdominal tumidity from meteorism, the pigmentation which may accompany the anaemia, and the marked emaciation.

[With a fatality rate as low as 1.5 per cent. throughout a series of 200 cases of a disease hitherto regarded as of the utmost gravity, it is naturally difficult to assess the value of these various forms of treatment. Each has had its advocates and each has apparently been successful

in its turn, perhaps because, as the authors state, most sprue patients are "of the intelligent and impressionable type" with idiosyncrasies. Their experience with calcium and parathyroid has been surprisingly at variance with that of other physicians both at home and abroad in Ceylon, India, Straits Settlements and South China. Several explanations may be offered for the failure of this form of treatment in the authors' cases; thus, there may be more than one form or variety of sprue, one amenable to calcium and parathyroid, another not, their patients having been of the latter category, or again they may have been unfortunate in having been supplied with an inert preparation of the gland, for there is no doubt that these are not stable under all conditions of age and climate.]

H. H. S.

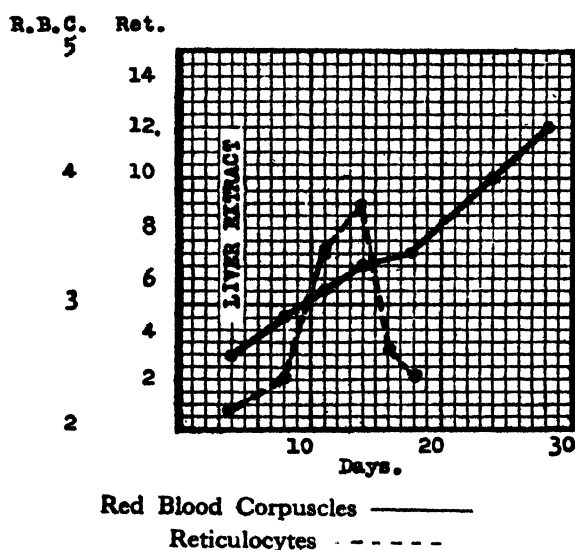
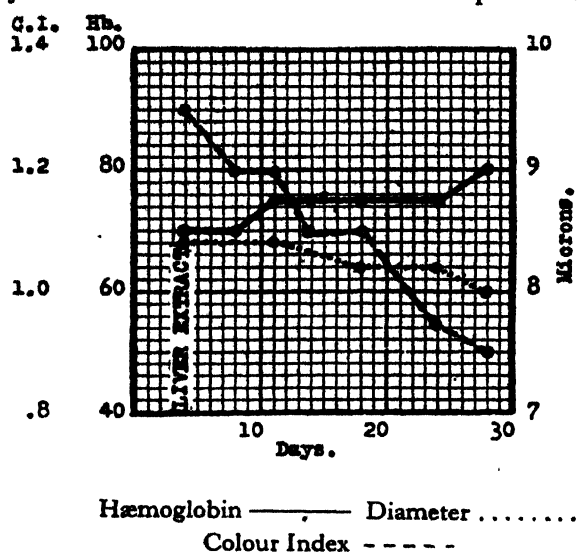
FAIRLEY (N. Hamilton). **Sprue. Its Applied Pathology, Biochemistry and Treatment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Aug. 8. Vol. 24. No. 2. pp. 131–179. With 7 graphs in text. [3 pages of refs.]

Dr. Fairley's paper, though reviewing the subject of sprue generally, is concerned largely with the biochemical aspect and his personal researches in this connexion. The blood changes are described in detail and the results of chemical examination of the blood and serum—the blood cholesterol, serum bilirubin and content of calcium and phosphorus. The anaemia was of the megalocytic type (as had been previously shown), the cholesterol content was low, the two extremes being 40 and 102 mgm. per 100 cc. in place of the normal 100–220 mgm. The author, in conjunction with MACKIE, had previously confirmed the reduction of ionic calcium and further figures relating to the total calcium are presented in this paper; the phosphorus content differed little, if at all, from the normal. The author also records the results of his analyses of the gastric contents and of the faeces. The former showed a decrease in the HCl, but rarely actual achlorhydria.

As a result of these investigations the author has proposed a scheme of "rational therapeutics" of the disease. The essential principles of the form of treatment advocated are: alimentary rest, restoration of the blood, and the reinforcing of demonstrable deficiencies. The first is attained by giving a diet of high protein content with low fat, low carbohydrate and adequate vitamin, for starchy food and the disaccharides give rise to acid fermentation and fat is poorly absorbed. The blood restoration is brought about by liver extract, aided at times by 6–12 units of insulin daily and the use of glucose. The effects of this treatment on the weight and on the blood are well shown in the accompanying graphs, which are merely examples of several depicted in the full paper.

The third principle—the reinforcing of demonstrable deficiencies—is largely met by symptomatic treatment, the exhibition of HCl where this is low, similarly as regards calcium, while the low fat diet is of much assistance in promoting the same ends. Five standard diets of graded caloric value are given in an appendix. [The author mentions that the parathyroid gland in three cases of sprue showing decrease in ionic calcium revealed no abnormality on microscopical examination. This

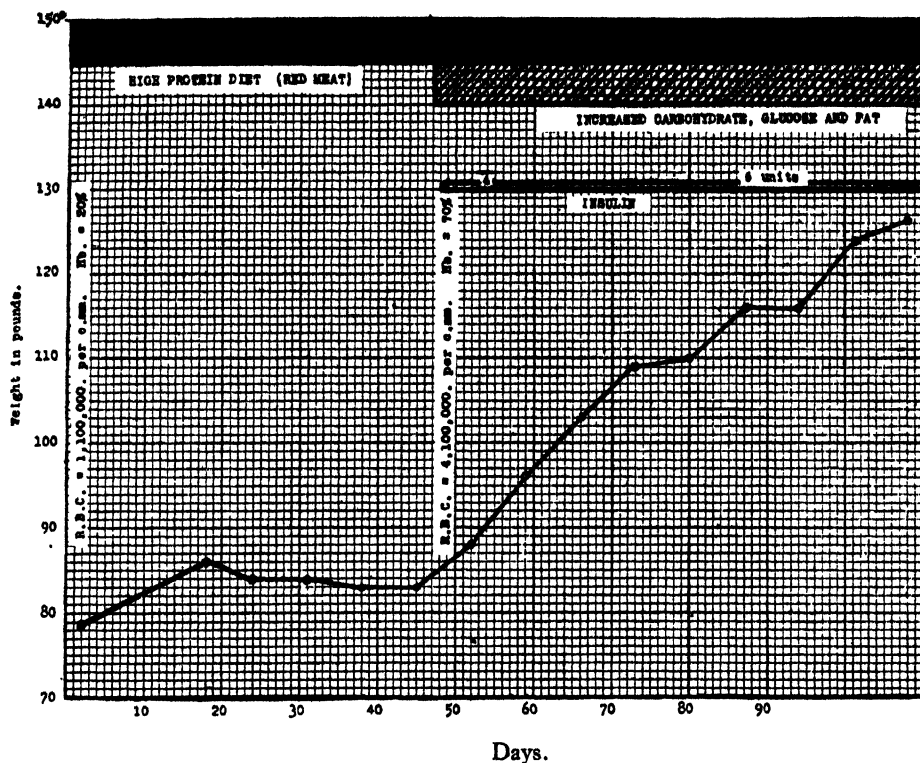
is what would be expected seeing that patients who react to treatment with preparations of these glands improve so rapidly that any disturbance present is almost certainly of a functional nature, and this is supported by the fact that after 3 weeks or so the patient's own glands



Effects of liver extract and high protein diet on the blood in sprue (*Case No. 8*). Normal acid curve marked response to histamine. Tetany: cramps: hour glass stomach present.

[Reproduced from *Transactions of the Royal Society of Tropical Medicine and Hygiene*.]

have sufficiently recovered to carry on their duties unaided. The paper is a most instructive one, and no true justice can be done to Dr. Fairley's work in a summary; the original must be studied. The deductions drawn, though at present largely theoretical, appear to



Weight curve of sprue patient (*Case No. 9*) illustrating effect of a 47 day alimentary rest on high-protein, low-fat, low-carbohydrate diet followed by a higher calorie diet supplemented by 6 units of insulin daily with glucose *per os*.

[Reproduced from *Transactions of the Royal Society of Tropical Medicine and Hygiene*.]

rest on a basis of sound pathological, haematological and chemical findings, and it is to be hoped that the newest form of treatment may meet with a better fate than its predecessors.]

H. H. S.

PORTER (William B.) & RUCKER (J. E.). **The Treatment of Nontropical Sprue with Liver Extract. A Report of Two Cases.**—*Amer. Jl. Med. Sci.* 1930. Mar. Vol. 179. No. 3 (696). pp. 310-316. With 2 charts in text & 2 figs. on 1 plate. [11 refs.] [Med. College of Virginia, Richmond.]

In a recent study of 45 patients having the macrocytic type of anaemia two patients were found to present clinical phenomena and laboratory data so distinctive that they could be classified as replicas of each other.

The cardinal features of the disease were the extreme degree of emaciation, severe anaemia of macrocytic type, chronic diarrhoea, normal amounts of hydrochloric acid in the gastric content, complete absence of neurological phenomena, rapid and consistent improvement following the feeding of adequate amounts of potent liver extract.

In the treatment of the two cases a general hospital diet was given with the addition of an aqueous extract of liver prepared in the Department of Medicine and Biochemistry of the Medical College of Virginia in amounts equivalent to 630 gm. of raw liver per diem.

In neither case was Ashford's monilia demonstrated nor did the patients present the characteristic "fatty" stools at the time of admission to hospital. The diagnosis of non-tropical sprue instead of pernicious anaemia was favoured because of the normal hydrochloric content of the gastric juice, the absence of neurological findings and the marked degree of emaciation. The finding of adequate amounts of hydrochloric acid in patients who have blood pictures of an advanced macrocytic anaemia strongly suggests that the megaloblastic anaemias may be dependent upon an independent factor; therefore adequate amounts of hydrochloric acid should be administered as a routine in the treatment of patients with a primary anaemia, regardless of how completely the blood has been restored to normal by liver feeding.

P. H. Manson-Bahr.

CASTELLANI (Aldo). **Brief Notes on the Administration of Liver, Pancreas and Stomach Extracts in Sprue.**—*Jl. Trop. Med. & Hyg.* 1930. May 1. Vol. 33. No. 9. p. 126. [2 refs.]

Castellani has been using liver in the treatment of sprue, although the results obtained are not so brilliant as those in pernicious anaemia. In 1925 he advocated raw pancreas, but patients usually greatly object to the taste. In two recent cases of sprue of medium severity with anaemia he has given stomach extract, called "ventriculin" and first prepared by E. A. Sharp, C. C. Sturgis and R. Isaacs, and now placed on the market by Parke, Davis and Co. It is claimed that this substance is more effective in stimulating reticulocytosis, more stable and more palatable than liver extracts. The preliminary investigations in sprue seem to Castellani favourable.

P. H. M-B.

HANCE (J. B.). **Notes on the Pathogenesis of Sprue and the Asthenic Diarrhoea of Indians. With Special Reference to the Rôle played therein by Amoebiasis. The Probable Identity of the Two Former Conditions, and their Connection with Addisonian Anaemia—Subacute Combined Degeneration of the Cord—Hunterian Glossitis Syndrome of Hurst.**—*Indian Med. Gaz.* 1930. Mar. Vol. 65. No. 3. pp. 125-130. With 1 text fig. [8 refs.]

In Kathiawar, asthenic and sprue-like diarrhoea appear to be so prevalent as almost to deserve the description of endemic. An analysis of 26 consecutive cases has been made. In some diarrhoea, in others anaemia has dominated the clinical picture, and in three the main symptoms have been nervous. Hance suggests that it is usually caused by the coexistence of intestinal ulceration and infection with a haemolytic streptococcus. The evidence he has collected goes to show that *E. histolytica* is usually the primary culpable agent, since in 15 out of the 26 cases cysts of this organism were found. Only two cases gave a positive agglutination to *Bact. dysenteriae*. Hance believes that the

streptococcus is the "ulcerating organism." The average age of the series of patients is 36, the oldest being 55, the youngest 19. Twenty-three were males and three females. Only one European figured in this series, Hindus were twice as often affected as Mahomedans, and this has further the significance that vegetarians are affected twice as often as non-vegetarians.

As regards the anaemia, the diagnosis must rest not upon the colour index, but upon the nature of the red blood cells observed. Poikilocytosis and anisocytosis are common—myelocytes invariable. Five of the present series showed paraesthesiae of the extremities comparable with early subacute combined degeneration of the cord.

P. H. M-B.

ASHFORD (Bailey K.). **Suggestions for a Rapid Classification of the Anemias of Sprue and Nutritional Unbalance in the Tropics.**—*Porto Rico Jl. Public Health & Trop. Med.* 1929. Dec. Vol. 5. No. 2. pp. 167-184. [School of Trop. Med., Univ. of Porto Rico, San Juan.]

The purpose of this paper is to suggest a brief method of arriving at fairly reliable diagnosis and treatment of the anaemias accompanying nutritional unbalance of the tropics and its common sequela—sprue. All persons suffering from clinical sprue or its preceding nutritional unbalance have had their haemoglobin percentage estimated by the Dare instrument. In all cases with an haemoglobin percentage of less than 70 per cent. a red and white cell count has been performed. All cases coming under the latter category with a colour index of plus 1 or over, and with haemoglobin below 50 per cent., have in addition had a differential count of leucocytes and a careful measurement of ten erythrocytes in a field performed. This should always be supplemented by a count of the reticulocytes, which in cases presenting a picture of the pernicious type of anaemia should be made four, seven and ten days after the first administration of liver extract in order to catch, at least, the up or down curve of the reticulocyte peak.

Those cases which do not respond to liver extract after two weeks of administration may be suspected of being hypoplastic and this expensive remedy should be stopped. One should not be satisfied with one Price-Jones curve, but make not less than one such curve a week. The reduction in anisocytosis is thus more sharply defined and the return to a normal mean gives a more convincing proof of approaching recovery; it will be necessary to measure one hundred cells each time.

It is reprehensible to withhold liver or an extract of it from a case of true pernicious anaemia, nor is it advisable to administer iron to a liver already choked with it. Liver extract should not be administered as a routine to cases of secondary anaemia or most of all in a case of haemoglobinaemia. There are two striking differences between the pernicious anaemia of Addison seen in the temperate zone and the pernicious anaemia of sprue: in only three of the forty-two cases of sprue anaemia were normoblasts or megaloblasts seen, and then only extremely few. The reticulocytosis following the administration of liver extract is usually feeble compared to the vigorous rise of the curve apparently the rule in Northern countries.

P. H. M-B.

ASHFORD (Bailey K.). **The Anemias of Sprue. Their Nature and Treatment.**—*Arch. Intern. Med.* 1930. May. Vol. 45. No. 5. pp. 647–673. With 13 charts. [2 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan, & Columbia Univ., New York.]

Twenty-four cases of sprue with the pernicious type of anaemia were studied for the purpose of contrasting them with a non-megaloblastic type of anaemia.*

The anaemias are considered as falling into two divisions, (1) the nonmegaloblastic or "secondary" anaemias,* (2) the megaloblastic, medullary or "primary" anaemias. The use of liver as a therapeutic agent for the treatment of patients with megaloblastic anaemia has afforded a ready means of dividing pernicious anaemias into those which yield a definite rise in reticulocytes and those which do not. The pernicious forms are divided into dysplastic, hypoplastic and aplastic types.

In this series of anaemia, sixteen cases had developed during the course of sprue and all but one of these were megaloblastic in type. Eight of the sixteen were cases of dysplastic anaemia, of which six yielded a definite rise in the number of reticulocytes after administration of liver extract prepared by Lilly and Co.

The results of treatment in dysplastic types of anaemia were satisfactory in so far that all but one of the patients were cured during a period varying from two to five months. By rough calculation the average number of days required for liver extract to effect a rise in reticulocytes was five.

[The remainder of this paper is almost impossible to summarize on account of the number of tables and graphs and individual protocols of illustrative cases.]

P. H. M-B.

NUNEZ (P. Escuder). Un cas de sprue ? (Auto-observation.) [**PA Case of Sprue. By the Sufferer.**—*Presse Méd.* 1930. May 3. Vol. 38. No. 36. pp. 606–607.]

This is a well-told tale of sprue by a Montevideo doctor who was himself the victim. In December 1926, whilst in Paris, he began to suffer from glossitis, which caused him little concern as otherwise he was in perfect health. On his return to Uruguay this symptom continued with exacerbations till October 1928, that is to say, for two years. In the meantime his general condition changed. He began to waste and to be easily fatigued, and sprue-like diarrhoea appeared. The symptom complex was as follows: Aphthous glossitis, sprue-like diarrhoea, loss of weight to 23 kilos, anaemia, lack of assimilation, pigmented patches on the forehead and temples. This state of affairs continued till June 1929; many remedies were tried in vain. Only blood transfusions, of which he had twelve, totalling two litres, greatly improved the anaemia, but did not stop the

*There appears to be a growing tendency to describe this anaemia as of the megaloblastic type. In only two of the cases detailed are normoblasts mentioned and there is no record of megaloblasts being present. In one (case 4) there were 8 normoblasts per 100,000 red cells; nevertheless, it is stated "a typical megaloblastic anaemia curve . . . is seen"; and in case 5 "no normoblasts were ever seen . . . This case is in many respects one of the most illustrative in the series of the characteristics of the megaloblastic anaemias of sprue." Seeing that the chief characteristic change in the red cells is the relatively large number with a diameter above the normal, would not "*megalocytic type*" be a more appropriate term?—[ED.]

diarrhoea. In June 1929 he read a paper by Dr. Ed. ANTOINE [this *Bulletin*, Vol. 26, p. 491] and realized that he was suffering from sprue, though it had never been recorded in Uruguay, Argentina, or Chile. An appropriate régime with calcium carbonate and neutral phosphate of calcium by mouth helped to cure him. Search for the *Monilia psilosis* of Ashford, in the faeces, proved consistently negative.

He considers this the first case of autochthonous sprue to be recorded from Montevideo.

P. H. M-B.

Low (G. Carmichael) & Dixon (D. Strangways). **Pseudo-Sprue.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 525-528. [Hosp. for Trop. Diseases, London.]

Pseudo-sprue indicates a clinical condition which somewhat resembles true sprue, but which eventually declares itself to be something else. In this striking case the patient had been ill for two years with fatty diarrhoea and very considerable abdominal pain located in the right iliac fossa. A provisional diagnosis of carcinoma of the transverse colon was made and at operation a colloidal carcinoma of the head of the pancreas was demonstrated.

The moral is that in diagnosis too much reliance should not be placed upon fat analysis of the stools, which in this case was misleading, the proportion of neutral fats to fatty acids being 1 : 5, whereas in carcinoma of the pancreas the opposite should have obtained.

P. H. M-B.

HAMET (H.). Revue des travaux récents à l'étranger sur la sprue tropicale. [Review of Recent Work on Tropical Sprue.]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 998-1009. [6 refs.]

A review of recent work on sprue mainly with reference to the contributions of ASHFORD and the value of monilia vaccines in treatment, all of which have received adequate notice in this *Bulletin*.

P. H. M-B.

REVIEWS AND NOTICES.

SALZBERGER (M.). **Die Lepra der oberen Luftwege und des Ohres in Palästina und Cypern.** [Leprosy of the Ear and Upper Air Ways in Palestine and Cyprus.] Erweiterter Sonderabdruck aus *Monat. f. Ohrenhk. u. Laryngo-Rhinol.* 1928. Jr. 62. Hefte 10-12. 44 pp. With 10 text figs. & 3 coloured plates. 1929. Urban & Schwarzenberg: Berlin N, Friedrichstrasse 105. Vienna I, Mahlerstrasse 4. [Unbound Rm. 4.]

Dr. Salzberger's experience in what may well be termed the classic land of leprosy has given him an opportunity of which he has taken good advantage. For, as a matter of fact, although the disease causes widespread change and destruction in the regions of the throat, nose and ear, very little attention has hitherto been paid to it by otolaryngologists. For that reason, we extend to this monograph a hearty welcome, coupled with a mild regret that the author has left his work so incomplete.

The fact is that although he has given detailed, and even minute descriptions of the manifold changes visible in the leprosy nose, throat, and ear, he paints them as if from stationary pictures, relying largely upon statistics. But when we look for a compendious account of the march of a progressive disease from start to finish, we look in vain. Doubtless, opportunity is wanting in so slowly progressing a malady to follow a number of cases throughout their long career. But this difficulty could have been overcome surely by the assembling of the individual items from early, medium, and late cases, and by building up, in that way, a complete history of the disease as it affects these regions.

Apart from that drawback, however, the brochure is a praiseworthy piece of conscientious work and is sure of a welcome from the otolaryngological practitioner.

The book is well illustrated, the black and white figures being particularly useful. A number of coloured plates are also supplied. They are moderately good. There is no index.*

Dan McKenzie.

MUIR (E.) [M.D., F.R.C.S. (Edin.), Research Worker in Leprosy, School of Tropical Medicine and Hygiene, Calcutta]. **Leprosy, Diagnosis, Treatment and Prevention.** Fifth Revised Edition.—67 pp. With 25 figs. Published by the Indian Council of the British Empire Leprosy Relief Association, Delhi and Simla.

The fact that this popular little work has reached the fifth edition shows that it has admirably fulfilled its purpose in bringing the practical essentials regarding the disease into a small compass for the use of the numerous body of medical men in India and elsewhere who are engaged in treating lepers on modern lines. Advantage has been taken of the opportunity to bring the work up to date by including an account of the red corpuscle sedimentation test, which has proved of much value in regulating the dosage of the drugs used, to ensure that no unduly severe and injurious reactions are produced. The hot and cold processes of

* The tropical practitioner in charge of leprosy camps and the like will be chiefly interested in the following (in original) extract from Dr. Salzberger's preface —

"No Leper can be regarded as really negative on the sole ground of negative results of smears, taken haphazardly from the air passages. Dr. Canaan's and my experience in the Leper House in Jerusalem, has shown that in 25 per cent. of such Lepers who have been for 2 years or more negative for the bacilli of Hansen, were positive, when the smears were taken by a Laryngo-rhinologist."

preparing hydnocarpus esters have been reintroduced to meet the requirements of leper institutions, and the lines are sketched on which leprosy surveys and campaigns have been elaborated in accordance with recent experience in India. The new edition is certain to retain the great popularity of its predecessors.

L. Rogers.

HERMANT (P.) & CILENTO (R. W.). **Report of the Mission entrusted with a Survey on Health Conditions in the Pacific Islands, October 1928 to April 1929.**—League of Nations. Health Organisation. C.H:829. 116 pp. With 2 text figs. & 5 maps. 1929. Dec. Geneva.

Dr. P. Hermant, of the French Service in Indo-China, and Dr. R. W. Cilento, Director of the Division of Tropical Hygiene of the Australian Commonwealth Department of Health, were chosen to make a preliminary survey of certain archipelagos in the South Pacific under a scheme promoted by the Health Organisation of the League of Nations. The purpose of the visit was not the carrying out of research but the surveying of the outstanding problems of the country. The authors were away from Australia between five and six months, and during that time they visited south-east New Guinea and a number of accessible places ranging through Melanesia to Fiji. They did not visit any places in Polynesia, so that the title of the report is perhaps a little inappropriate.

It is not easy to gain any concrete information from reading the results of the tour. A considerable proportion of the space is devoted to programs of work which might be done. This is followed by short accounts of the prevalent diseases, among which the most important are yaws, ankylostomiasis, filariasis and malaria. The medical education and nutrition of the native races and other topics are also discussed in general terms. Little that is said is new, and after reading the report one feels that, though the authors rightly emphasize the enormous amount that yet remains to be done, their readers will hardly appreciate the considerable body of ascertained facts which already exists. They give, for instance, 2½ pages of generalizations to the depopulation of parts of Melanesia, and they rightly say that this is perhaps the gravest of all public health problems of the country. They lament the "prevalence of opinions and paucity of authoritative figures" but they make no reference to several collections of numerical data which have been published, of which perhaps the most notable is BAKER's detailed survey of an area in the island of Santo, New Hebrides [see this *Bulletin*, Vol. 26, p. 416].

P. A. Buxton.

D'HERELLE (F.), MALONE (R. H.) & LAHIRI (M. N.). **Studies on Asiatic Cholera.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1930. Feb. Memoir No. 14. pp. v+161. With 8 charts on 6 plates. [Refs. in footnotes.]

The researches here set forth were undertaken at the invitation of the Government of India and financed by a grant from the Indian Research Fund Association. They include a study of the pathology of cholera in patients treated in the Campbell Hospital, Calcutta, where the study can be seriously undertaken. Results thus obtained were confirmed in a series of experiments conducted in villages of the Punjab on patients treated in their own homes. In the course of these researches the authors also studied the various properties of the vibrios isolated; made a collection of bacteriophages virulent for the vibrios; observed the effect of the ingestion of cultures of bacteriophages on persons attacked by cholera and the effect on the bacteriophages of passages through the bodies of patients. They also studied the action of bacteriophages on vibrios *in vitro* and the muta-

tions produced. Chapter I deals with the various characters and life history of the cholera vibrio. The characters appear to be very stable with the exception of virulence, which seems to be lost very rapidly when the organism is cultivated outside the body of man, but can be regained when circumstances are favourable. The nature of its toxigenic power is unknown. A full description of the cholera bacteriophages is given and it is stated that the bacteriophage is a living corpuscular being, extremely minute, belonging to the protobes (ultra-viruses). It is a parasite of bacteria which it destroys while reproducing at their expense. The general characters of the bacteriophages on cholera vibrios are the same as those of other bacteriophages already discovered and the technique of their isolation is the same. In the intestines of patients both vibrios and bacteriophages possess individuality which is lost by serial cultures on artificial media. The bacteriophage is a normal inhabitant of the intestines, where it parasitizes the saprophytic bacteria of the normal intestinal flora and multiplies at their expense. It varies in virulence, but may reach a maximum virulence rapidly, when the vibrios are rapidly destroyed, the symptoms disappear and the patient becomes convalescent. A cultivated bacteriophage of maximum virulence given by the mouth will therefore be useful for treatment (it must not be injected) and a table given on page 97 shows this to be the case. Out of 17 cases so treated only 1 died, while out of 18 control cases 12 died. Several other tables from other villages give similar relative results. Part II contains also much interesting matter connected with the pathology of cholera. Part III deals with epidemiology and prophylaxis.

J. H. Tull Walsh.

PLÁ (Juan C.), TALICE (Rodolfo V.) & SURRACO (Norris L.). **La fiebre recurrente española. Estudio clínico y experimental.** [Spanish Relapsing Fever. A Clinical and Experimental Study.] —*An. Facul. de Med. Montevideo*. 1929. Oct. & Nov. 1930. Feb. 107 pp. With 38 figs. & 10 diagrams. [15 refs.]

This monograph gives a very good survey of the *Treponema hispanicum*, and the symptoms it produces, its biology, transmission, and its employment in the treatment of other diseases. The work starts with the history of Spanish relapsing fever. The first recorded case was that of Sadi de BUEN in 1922, and the same investigator later reported on 65 cases seen between 1922 and 1926. Since then others have noted cases. Next follows an account of the aetiology of the disease, the biology of the *Treponema* and its transmission by *Ornithodoros maroccanus* and of the experimental work in connexion therewith mainly carried out by NICOLLE and ANDERSON at the Pasteur Institute, Tunis. The author also made a study of the possibility of conveyance by *Pediculus vestimenti* in Montevideo, but with negative results. Clinical investigations are exemplified by charts and accounts of patients, from which it is seen that the incubation period varies within fairly wide limits of 1 to 7 days, the average being 4 days. The febrile period lasts 3-4 days and the apyrexial for 8 days. The symptoms are considered in detail and an account of the blood changes, by which it is seen that there is an invasion leucocytosis up to 18,000 per cmm. with a fall as low as 4,000 at the end of the febrile attack and beginning of the period of apyrexia, while there is considerable anaemia to 2,800,000 red cells per cmm. The disease reacts very readily to injections of salvarsan, but if left untreated spontaneous cure usually takes place in 2-2½ months.

The final section of the monograph deals with the application of the *T. hispanicum* in the treatment of general paralysis, tabes, dementia praecox, etc., for which it is considered particularly suitable owing to the mildness of the disease set up and its easy control by arsenicals. It is thus believed to be better than malaria for this purpose. The work is well illustrated by charts clearly reproduced.

H. H. S.

Proceedings of the Third Scientific Medical Congress of Middle Asia, 20-24 December, 1928.—Supplement to *Pensée Méd. d' Usbékistane et de Turquemenistane*. Tashkent. 1929/1930. 316 pp. [In Russian.]

The proceedings contain over 150 abstracts of papers in the various branches of medicine read at the Medical Congress in Tashkent. The following is a review of some of the papers dealing with diseases of tropical and sub-tropical countries.

L. M. ISSAYEV discusses "The Epidemiology of malaria in Middle Asia" (p. 18). In 1922 the whole country was overrun by an epidemic of malaria which subsided only towards 1928. As the incidence of malaria diminished the predominant form of parasite changed. *Plasmodium falciparum* was replaced by *P. vivax* and the latter by *P. malariae*. In some regions, chiefly in the plains, the malarial indices fell to a very insignificant figure. In these regions malaria is of an epidemic character. In other regions the degree of infectivity remained fairly constant, malaria being endemic. The only regions which can be regarded as free of malaria are the non-irrigated areas of the plains and the mountainous regions over 5,000 feet above the sea.

One of the factors responsible for the diminution of malaria was the gradual amelioration of the economic conditions in the country, especially the increase of arable land and improvements of irrigation.

YAKOVLEV, A. F. "Combined treatment of malaria with arrenal and quinine" (p. 21). Twenty-six relapse cases were treated as follows. Every other day 0.5–1.0 cc. of 5 per cent. arrenal was injected intravenously, and in the intervening days subcutaneous injections of 2 cc. 30 per cent. quinine hydrochloride and 1.5 per cent. methylene blue were administered. In the evening following the injection of arrenal 0.6 gm. quinine was given orally. The whole course of treatment consisted of four injections of each drug. The course was followed by interrupted quininization during one month. The treatment resulted in a cure in 22 cases, and no relapses were observed during 1½–2 years in 20 cases. The best results were obtained with tertian fever, then with quartan, whilst in the case of malignant tertian with crescents the results were least satisfactory.

ISSAYEV, L. M. "Epidemiology of guinea-worm infection in Middle Asia" (p. 51). Measures for the eradication of guinea-worms in the township of Old Bokhara are described. A systematic examination of the population was undertaken and those found infected were treated in hospital. In order to prevent dissemination of the microfilariae collodion dressings were used and mercury perchloride was injected into the worm. Cyclops were collected from all the ponds and examined for filariae. Ponds in which infected crustaceans were found were closed up, dried and cleaned.

As the result of these measures, carried out in the course of the last five years, the incidence of guinea-worm infection which reached 20 per cent. in a population of 50,000, fell to ¼ per cent. in 1928. It is expected that by 1931–1932 the guinea-worm will have disappeared from the locality. The author notes that dogs have been experimentally infected with this nematode, and it is hoped that use can be made of this animal for the study of some obscure points in the biology of this worm.

MOLTCHANOV, S. A., and BUROVA, L. F. "The Effect of X-rays upon *Leishmania* cultures" (p. 56). In connexion with the method of treatment of leishmaniasis with X-rays their effect was tested upon cultures of *Leishmania donovani* and *L. tropica*. NNN cultures were exposed to the action of from 50 to 500 per cent. NED. Both species of *Leishmania* were found to be susceptible to X-rays. The number of parasites decreased, degenerate forms appeared and the culture died much earlier than the controls. The rate of destruction depended upon the dose of rays (optimum 70–100 per cent. NED) and the age of the culture, 6-day cultures being the most resistant, while older cultures perished more rapidly.

SHEVTCHENKO, F. I., and SOFIEV, M. S. "On the viability of *Leishmania canis* in the gut of *Phlebotomus papatasi*" (p. 64). The authors record some experiments of infection of sandflies with *Leishmania canis*. It is noted that 96 per cent. of the flies ingested parasites with the blood. During the first 19 hours of development in the sandfly the parasites remain in the leishmania stage after which flagellate forms appear. In the majority of fed sandflies the flagellates degenerate and die out, only very few remaining infected after the fifth day.

CHAPURSKAYA-BAJENOWA. "On Lambliasis and its treatment with Osarsol" (p. 116). It is maintained that *Giardia intestinalis* is pathogenic to man, its occurrence in the duodenum being associated with the presence of mucus and pus. Cases were treated with Osarsol, a Russian preparation of the same composition of stovarsol. The method of treatment and dosage are not indicated. Repeated treatment resulted in disappearance of the clinical symptoms, but the parasites did not disappear entirely from the stools, the host becoming a carrier. In some cases relapses were observed.

C. A. Hoare.

FINDLAY (G. M.) [O.B.E., M.D., D.Sc., Wellcome Bureau of Scientific Research, London]. **Recent Advances in Chemotherapy.** With a Foreword by C. M. WENYON, C.M.G., C.B.E., M.B., B.S., B.Sc., F.R.S.—pp. viii+532. With 11 text figs. & 4 plates. 1930. London: J. & A. Churchill, 40 Gloucester Place, Portman Square. [15s.]

The scope of this book is defined in the preface as "an attempt . . . to describe the more important advances in chemotherapy which have occurred during the post-war period." In old established sciences such as anatomy and physiology, and even in bacteriology, there is an abundance of text-books which contain the accepted facts and current theories, so that recent advances may be adequately dealt with in a series of independent essays. But systematic experimental investigation on chemotherapy practically began with EHRLICH and SHIGA's researches on trypanred published in 1904, and during the following 10 years work on the subject was limited to a few laboratories where pioneer investigations were carried out. In a new field, especially under the inspiration of an experimenter of genius such as EHRLICH, there is likely to be a rich harvest of discovery—and this was the case in chemotherapy. But very few books, especially in English, contain a systematic account of the early investigations, and as they are referred to in the present volume only incidentally the reader may not see clearly wherein the advances consist. There would have been a good excuse for regarding the whole of the past quarter of a century's work as recent advances. The biological bearings of chemotherapeutic research could then have been developed in a connected fashion, since the first period produced a great number of important positive achievements, while the later years have afforded evidence that many theoretic generalizations based on the early work were too broad and require qualification. As the author has restricted the aim of his book, however, it may be said that it contains digests of a very great quantity of recent literature and also treats of some of the earlier work. The ground covered is extremely wide—infections caused by helminths, protozoa, spirochaetes, fungi, bacteria and viruses, both in man and animals, are dealt with, as well as cancer. The difficult problem of relations between chemical constitution and therapeutic action receives considerable attention. Prominence is given to the results of treatment in the human subject and many therapeutic details are included; as might be expected, there is a considerable mass of contradictory statements. Occasional neglect of experimental evidence seems to be responsible for such a generalization as that "infections due to bacteria are at present largely uninfluenced by chemotherapy. This

failure applies both to localized infections and to general septicaemic conditions." While it is accepted that the only septicaemic affection amenable to a chemotherapeutic agent is that due to the pneumococcus in mice when treated with optoquine, considerable progress has, however, been made in the treatment of localized bacterial infections. Again, one reads that "all the chemical antiseptics at present in use in addition to combining with bacterial protoplasm and so causing death of the bacteria also enter into combination with other albuminous matter and are, in fact, general protoplasmic poisons"; this statement is true in the sense that all substances are poisons when the dosage is excessive, but it seems to neglect the differences in relative toxicity for bacteria and for mammalian tissues exhibited by substances such as phenol and corrosive sublimate on the one hand, and antiseptics such as those of the acridine series on the other.

It should be remarked that WALBUM's metal salt therapy is not mentioned, since it promises to be one of the most striking of recent advances. Also, this form of therapy appears to be an outstanding example of the fact stated by the author in his preface that "the focus of attention has tended to shift from a study of the direct interaction of drugs with infecting organisms to an investigation of the part played by the tissues in chemotherapeutic treatment."

The book affords a valuable store of references for those interested in any particular aspect of chemotherapy and as such should be highly appreciated.

C. H. Browning.

REED (Alfred C.) [M.D.]. **Tropical Medicine in the United States.**—pp. xiii+410. With 60 illustrations. 1930. Philadelphia & London: J. B. Lippincott Co. [25s.]

In his preface Professor Reed, of the University of California, says he has had one object only in view: "to present a serviceable guide to the physician in the United States in his contacts with tropical medicine." "Not a monographic review or an exhaustive text-book, but a useful clinical pocket guide has been our object." The author has most successfully attained his object; he has produced an eminently readable book but one which should be classed as a text book rather than a pocket guide. Certain subjects for good reasons are not dealt with, such as African trypanosomiasis and melioidosis, and others are dealt with shortly, such as Brazilian trypanosomiasis. On the other hand, among protozoal diseases intestinal flagellosis, ciliosis and coccidiosis are dealt with, under bacillary diseases tularaemia finds a place, under mycotic diseases mycotic splenomegaly, blastomycosis and bronchomycosis receive notice. Systematic parasitology naturally finds no place in this volume, but there is a useful chapter on arthropod parasites.

A few minor criticisms may be made. While the causal organism of relapsing fever is referred to as *Treponema recurrentis* those of syphilis and yaws are given as *Spirochaeta pallidum* and *pertenue*. Oxyuris appears (perhaps purposely) instead of enterobius, etc. Some printer's errors were noted: SINTON's name appears as Linton and ROUSSEL as Roussa. Again, it is questionable if it be correct to speak of the small outbreaks of yellow fever which have occurred in south European seaports in the terms—"Europe has been visited by devastating epidemics in recent times." Some expressions, too, are liable to misinterpretation. In speaking of the work of the Rockefeller Commission on yellow fever in West Africa, "They found, most important of all, that the common monkey, *Macacus rhesus*, was very susceptible to yellow fever," leaving the reader to believe that this monkey is common in W. Africa.

Under relapsing fever reference is made to great enlargement of the spleen and liver and to the abundant spirochaetes in the blood during the

febrile attacks, but it is not noted that these phenomena are very variable. The sections on climatic bubo and inguinal granuloma, diseases upon which a good deal has been written in recent years, are poor, and pellagra, upon which one might have expected a better account, is rather sketchily dealt with. These are but minor points which will doubtless receive attention in the next edition of a book which will prove a most useful one to American practitioners.

H. S. Stannus.

GABBI (Umberto) et al. **Relazione a S.E. Emilio de Bono ministro delle colonie degli studi compiuti nel Bassopiano Occidentale dell'Eritrea dai Professori Umberto Gabbi—Luigi Piras—Edoardo Zavattari—Mario Peruzzi—Giovanni Di Domizio—Alberto Ciotola e delle indagini complementari fatte in Italia dai Professori Alberto Camis e Alfredo Chistoni. 7 Gennaio-18 Marzo 1930—Anno VIII era fascista. Agordat—Parma—Pavia—Padova.** [Medical Report on Western Eritrea.] pp. vii+309. With 129 figs. & 2 plates. 1930. Parma: Prem. Tip. Riunite Donati.

This is a report submitted to the Minister for the Italian Colonies by a medical mission working in western Eritrea from January to March, 1930. The constitution of the mission is sufficiently set forth in the title, and full details of the work which the members set out to accomplish in human and veterinary medicine are given in the early pages of the report. A description of the country, its climate and products is given and special attention is paid to the irrigation works of the plains of Tessenei destined to become a valuable area for the growth of cotton. The general and common diseases do not require much notice. Professor Gabbi contributes papers on malaria, syphilis, yaws, leprosy, etc. As regards malaria the chief transmitter is *Anopheles costalis*. The question of bovine pest and the possibility of immunization is discussed and there is a long and well-illustrated chapter on trypanosomiasis in cattle caused by *Tr. cazalboui*. Plants with medical or poisonous properties are noted. Prof. Zavattari describes the snakes, scorpions and blood-sucking mites, ticks and flies, each section being well illustrated; indeed, the number of illustrations is a marked feature of this book. Prof. Camis writes about the alimentary food-stuffs in use in the area visited.

J. H. Tull Walsh.

ESCOMEL (Edmundo). **La tricomonomosis intestinal.** [Intestinal Trichomoniasis.]—57 pp. 1929. Lima: Imprenta Torres Aguirre.

This is a monograph summarizing the author's views on a subject which he has studied since the beginning of the century. He states that "between 1898 and 1913, 150 cases of disease due to *Trichomonas intestinalis* had been proved in Arequipa alone" and since 1913 the numbers of patients observed had quadrupled. He regards the infection as constituting a definite morbid entity and occurring in Europe, Asia, Africa and America. The flagellate may exist saprophytically, or may assume pathogenic properties and give rise to symptoms which he classifies as dysenteric, with or without blood, choleric, acute passing to chronic, and chronic with exacerbations. An account of its life-history and of the differences between the intestinal and vaginal forms is given. Diarrhoea, with spontaneous recovery, followed rectal injection of material containing the parasite into cats and dogs; in human cases infection may be direct, or through the agency of flies and other insects, or by water, any gastrointestinal disturbance of an irritant nature predisposing. As complications

he mentions intestinal perforation and hepatitis going on to abscess formation, and describes illustrative cases of these. Intestinal ulceration is found post-mortem. Treatment by means of ipecacuanha, calomel, creosote, β -naphthol, tannalbin, etc., is ineffectual, but turpentine by mouth and by enema, and iodine irrigations are regarded as specific. Diagnosis is made by finding the parasite in the faeces, often in large numbers, and as they disappear so the symptoms abate. [It is noteworthy that neither in the pus of the liver abscess nor in the sections made of the intestine was *Trichomonas* detected; at all events this fact is stated in the former and no mention is made of them in the latter, though minute histological details are given. Further evidence will be needed before the pathogenicity of *Trichomonas* is generally accepted.]

H. H. S.

ESCOMEL (Edmundo). **Las disenterias en Arequipa.** [Dysentery in Arequipa.]—109 pp. With 6 figs. on 4 plates. 1929. Lima: Imprenta Torres Aguirre.

This is stated by the author to be a work presented at the Pan-American Medical Congress held in Lima in 1913, with corrections and additions. He divides the forms as seen in Arequipa into amoebic, trichomonad, balantidial, malarial, lamblial and that due to *Tetramitus mesnili*. Bacterial dysentery does not occur, or is very rare. "Capsicum dysentery" due to the excessive use of condiments, and diarrhoea associated with the presence of *Blastocystis*, "cancerous dysentery" and "dysenteriform colitis" due to hookworm, are also noted. [The term dysentery has been given a very wide application, covering diarrhoea generally.] The major part of the article is devoted to *Trichomonas* infestation and is in the main a repetition of the preceding, the other receiving but a few words.

A second paper by the same author, written in French, covers much the same ground, with an additional note on 25 cases of liver abscess cured by emetine without surgical intervention. A few remarks on some flagellates found in Batrachia and reptiles, and a brief account of a diabetic aged 60, in whose urine withdrawn by catheter were numerous living *Trichomonas* with the characters of *T. vaginalis*, conclude the paper.

H. H. S.

LEITCH (J. Neil) [M.D., B.S. (London), M.R.C.S. (England), etc., Pathologist, West African Medical Service, etc.]. **Dietetics in Warm Climates, including Foodstuffs, their Analyses and Rôle in Disease.** With an Introduction by His Excellency, Brigadier-General Sir J. A. BYRNE, K.C.M.G., K.B.E., C.B.—486 pp. With 62 figs. on 35 plates. 1930. London: Harrison & Sons, Ltd., 44-47, St. Martin's Lane, W.C. 2. [25s.] [Review appears also in *Bulletin of Hygiene*.]

There are many who believe that man's instincts and natural appetites are trustworthy guides to the selection of the food that is best for him. This view is sometimes supported by the contention that uncivilized man exhibits to-day a freedom from diseases associated with defective feeding which are rife among the more cultivated races. One of the purposes of this volume is to convince the reader that, however reliable man's feeding instincts may be in theory, in every quarter of the world at the present day the less civilized races of mankind are suffering even more from diseases directly or indirectly associated with dietary deficiencies than the more highly civilized races. The mass of information it contains includes a

survey of dietaries in Asia, Africa, South America and the East and West Indies, lists of tropical foods, including in many instances their chemical analysis and special nutritive or toxic properties, and an account of the known facts regarding the relation of diseases met with in the tropics to specific food deficiencies.

The subject is a vast one and requires for its adequate treatment personal experience in all quarters of the globe. The author has himself had medical experience both in Africa and the Far East and is therefore intimately acquainted with many of the dietary problems which he deals with. For the rest he has relied on replies to a circular letter broadcasted throughout the tropics and on original papers published in medical and scientific journals which he is constantly quoting at considerable length. It is most unfortunate that the heavy expenses of publishing this compilation should have made it appear advisable to include bound up in the text a good deal of advertising matter, which must shock the reader who is dispassionately seeking the truth in what is apparently a scientific treatise. Nevertheless, the white man who wishes to know how he can best feed himself and his family in the tropics, or the administrator supervising the dietaries of natives under his care will each find much valuable information at his disposal in the present work and the numerous references to original papers will enable the reader to pursue further any subject in which he is particularly interested.

S. J. Cowell.

McKENDRICK (A. G.). Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment.—League of Nations. Health Organisation. L.o.N.P. III. Health. 1930. III. 2. 158 pp. Geneva.

Following a resolution of the International Rabies Conference, convened by the League of Nations in 1927, a questionnaire as to the results of anti-rabies treatment was sent to every Rabies Institute throughout the world. Reports relating to 31,656 persons treated by various methods have been subjected to statistical analysis by Lt.-Col McKendrick and are here published in full, together with his conclusions, and certain other reports not included in the analysis. The schedule asked for details as to methods of treatment in use at the institute, the numbers of persons treated and deaths in a year classified according to race, animal responsible, evidence of rabies in the biting animal, depth and location of the bite, interposition of clothing and interval before treatment was commenced. The reports published in detail are from 22 institutes in Europe, 8 in Asia and one in Morocco, and the statistical analysis is based upon 30 of these. In addition there is a tabulation of 111,427 persons treated by 64 institutes in the Soviet Republics, received too late for inclusion in the analytical review. No information has yet been received from some 50 other institutes, and it is intended to publish further reports later.

The methods of treatment have been grouped for analysis under five main headings: (1) those employing cords dried for more than 24 hours; (2) a group of dilution methods in which the virus is presumed not to have been killed in the preparation; (3) methods using vaccines killed by phenol; (4) ether vaccines without addition of phenol; (5) ether vaccines subsequently killed by phenol. In the whole material the mortality averaged 0.49 per hundred treated. The significance of differences in mortality has been tested by calculating P, the probability that a given set of differences would occur in samples from a homogeneous population, and it is shown that the differences in mortality in the five treatment groups, and between live and killed vaccine groups, are for the most part accounted for by differing proportions of Europeans and non-Europeans in these groups. Thus the persons treated by dilution and ether methods were almost

entirely Europeans, whereas four-fifths of those treated by killed phenol vaccines were Asiatics. The distribution of mortality rates amongst the various institutes is also such as might be expected by chance when the statistics for the two racial groups are dealt with separately, but not if they are combined.

The main conclusions are therefore : (1) that non-Europeans are subject to a higher mortality risk than Europeans, and (2) that there is no decisive evidence that any clear advantage as regards mortality exists in favour of any one of the various methods, but the second conclusion is only provisional until larger statistics have been collected. As regards the influence of other factors, it is shown that wolf bites are about 40 times as fatal as dog bites, and are as fatal in Europeans as Asiatics, the mortality amongst those treated being 18 per cent. The relation of mortality to delay in starting treatment is ambiguous, for whereas those treated with phenol vaccines, mostly Asiatics, show a risk increasing with delay, this is not the case for other methods of treatment.

Intervention of clothing reduces the mortality six-fold, as previously found. Reference to the actual returns shows that about 70 per cent. of bites treated in European institutes were on the bare skin, so that even if we were to regard all clothing of Asiatics as too thin to afford protection, it appears that only a small fraction of the observed racial difference could be thus accounted for.

It should be noted that this investigation tells us nothing about the absolute value of any of the prophylactic methods in reducing risk, owing to absence of any control series which would be difficult to obtain, and the conclusions are such that they give no indication as to how great is the saving in mortality effected by the Pasteur institutions. This, however, was not the purpose of the research. In the work before us Lt.-Col. McKendrick has undoubtedly made the best possible use of the material at his disposal and has exercised a most commendable caution in his process of analysis and in interpreting the results of it.

P. Stocks.

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Am. signifies	Amoebiasis	and	Amoebic	Lept. signifies	Leptospirosis.
	Dysentery.			Mal.	" Malaria.
Bb.	" Beriberi.			Misc.	" Miscellaneous.
Bl.	" Blackwater.			Myc.	" Tropical Mycology.
B.R.	" Book Review.			Oph.	" Tropical Ophthalmology.
Chl.	" Cholera.			Pel.	" Pellagra.
C.Bu.	" Climatic Bubo.			Pl.	" Plague.
Der.	" Tropical Dermatology.			Rab.	" Rabies.
Dys.	" Dysentery (Bacillary and	and		R.B.F.	" Rat-Bite Fever.
	Unclassed).			R.F.	" Relapsing Fever and other
Ent.	" Enteric Fevers.				Spirochaetoses.
Fev.	" Fevers.			Sp.	" Sprue.
G.V.	" Granuloma Venereum.			S.S.	" Sleeping Sickness.
Hel.	" Helminthiasis.			Tb.	" Tuberculosis.
Hist.	" Historical.			Und.	" Undulant and Abortus Fever.
H.S.	" Heat Stroke.			Y.F.	" Yellow Fever.
K.A.	" Kala Azar.			Y. & S.	" Yaws & Syphilis.
Lab.	" Laboratory Reports.			Z.	" Medical Zoology.
Lep.	" Leprosy.				

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 Baylis, H. A., with Taylor, 961 (Hel.)
 Beattie, M. V. F., 901 (Z.)
 — & Howland, L. J., 296 (Z.)
 Beazley, R. N., 935 (Z.)
 Becker, J., with Bauer, 67 (Misc.)
 Bedier, E. & Chesneau, P., 960 (Hel.)
 Beer, W. A., with Gloster, Nambiar & Sastry, 259 (Rab.)
 Beihefte zum Archiv für Schiffs- und Tropen-Hygiene, 436 (B.R.)
 Beijnen, G. J. W. K., 348 (Sp.)
 Belezki, W. K. & Umanskaja, R. M., 115 (R.F.)
 Bell, P. S., 763 (Bb.)
 Bell, W. J., 730 (Pl.)
 Bellini, E., (362) (Z.)
 van Berkhout, P. J. T., 82 bis (Misc.)
 Bernard, E., 783 (Am.)
 Bernard, N., 764 (Bb.)
 Béros, G. & Balozet, L., 555 (Fev.)
 Bertrand, J., (600) (Misc.)
 Bertwistle, A. P. & Gregg, A. L., 75 (Misc.)
 Bessemans, A. & Thury, U., 125, 706 (Lept.)
 Betache, M. H., with Khalil, 460 (Hel.)
 Bethoux, L., 551 (Und.)
 Bettencourt, A. & da Silva, E. P., 457 (Hel.)
 Bezsonova, A. A., 739 bis (Pl.)
 — & Lenskaya, G. N., 738 (Pl.)
 Bhaduri, B. N., 27 (Oph.)
 Bhandarkar, P. R., (405) (Dys.)
 Bianchi, A. E., with Mazza, 466 (Hel.)
 Bianchini, A., (137) (Und.)
 Bichowskaja, A., with Roskin & Schisch-liaiewa, 837 (S.S.)
 Biesin, A., 66 (Misc.)
 Biggam, A. G., 202 (Mal.), 396 (Dys.)
 — & Arafa, M. A., 657 (Mal.), 788 (Am.)
 Biginelli, P. & Scordia, F., 573 (Misc.)
 Bilderbeck, (10) (Pl.)
 Billing, W. McG., 932 (Z.)
 Binet, with Laffont & Lesini, 662 (Mal.)
 Birt, E., 164 (Misc.)
 Bisceglie, V., 21 (Chl.)
 Bishop, A., 389 (Am.), 891 (Z.)
 —, with Dobell, 389 (Am.)
 Bishop, L. F. & Bishop, L. F., Jr., 381 (Am.)
 Bisset, E., (10) (Pl.)
 Biswas, S. K., 525 (Der.)
 Blacklock, D. B., Gordon, R. M. & Fine, J., 880 (Z.)
 Blagoweschensky, D. I., (600) (Misc.)
 Blajin, with Rukhadze, 446 (Hel.)
 Blajin, A. N., 414 (Hel.)
 Blake, A. V., with Okell, 399 (Dys.)
 Blanc, G. & Caminopetros, J., 146 bis (Fev.), 309 (Z.)
 —, Joannides, G. & Pangalos, G. C., 1005 (Lep.)
 Blanchard, M., 166 (Misc.)
 Blanchard, R. M., 330 (Lep.)
 Blank-Weissbeg, S., with Czarkowska, 699 (R.F.)
 Blaschin, A., 443 (Hel.)
 Bloch, J., with Segal, 207 (Mal.)
 Boak, R., with Carpenter, 545 (Und.)
 Boase, A. J., 767 (Pel.)
 Bodenheimer, E., with Igersheimer, 111 (R.F.)
 Boerema, J. C. & Vrij, M. P., 168 (Misc.)
 Bogoiawlenski, N., 313 (Z.), 622 (K.A.)
 Bogojawlenski, N. A. & Lewitzki, R. G., 446 (Hel.)
 Bogoslawskij, W. N., with Dwijkoff, 253 (Rab.)
 Boinet, Turriès & Poursines, 382 (Am.)
 Boisseau, R., with Sicé, 237 (S.S.), 794 (Dys.)
 de Boissezon, P., 296, 311, 905 bis (Z.)
 Bojlén, K., 797 (Dys.)
 Bombay, 370 (Lab.)
 Bonne, C. & Lodder, J., 529 (Der.)
 — & Soewandi, 895 (Z.)
 Borchardt, W., 654 (Mal.)
 Borel, E., 312, 898 (Z.)
 — & Labernadie, V. G. F., 311 (Z.)
 Bornshin, W., with Little, 799 (Dys.)
 Borrel, A., 984 (Hel.)
 Borruso, G., 161 (Misc.)
 Bose, A. N. & Banerji, B. N., 72 (Misc.)
 Bote, D. J., 35 (Misc.)
 Botez, M. A., 750 (Rab.)
 — & Albon, T. V., 258 (Rab.)
 Boughton, D. C., 894 (Z.)
 Boulay, A., 171 (Misc.)
 Bourguignon, G. C., 63 (Misc.), 528 (Der.), 815 (S.S.)
 Bowrey, R., with Connal, Paisley & Elmes, 9 (Pl.)
 Boyd, M. F., 911 (Z.)
 — & Aris, F. W., 193 (Mal.)
 Boyd, T. C. & Roy, A. C., 94 (K.A.), 570 (Misc.)
 Boyé, 139 (Fev.), 496 (Y.F.), 733, 735 (Pl.), 814 (S.S.)
 Brace, R. W., 775 (Pel.)
 Bragina, 909 (Z.)
 Brahmachari, B. B., 19, 858 (Chl.)
 Brahmachari, U. & Banerjea, R., 612 (K.A.)
 —, with Gupta, J. M. D., Banerjea, R. & Basu, B., 613 (K.A.)
 —, with Sen, P. B. & Banerjea, R., 613 (K.A.)
 Braimbridge, C. V., 583 (Misc.)
 Brancaert, J., 524 (Der.)
 Brandau, G. M., 913 (Z.)
 Brangwin, C. H., 990 (Hel.)
 Branisteau, with Nubert, 790 (Am.)
 Brás de Sá, L. J., with de Mello & d'Arbeu, 657 (Mal.)
 Braul, J. E., 674 (Lep.)
 Braun, H. & Baake, F., 798 (Dys.)
 Bray, G. W., 997 (Lep.)
 Breed, W. B., 753 (Rab.)
 Brennan, C. H., 330 (Lep.)
 Brigham, G. D., with McAlpine & Plastridge, 550 (Und.)
 Brighenti, D., 308, 908 (Z.)
 Briscoe, R. C., 439 (Hel.)
 British Empire Leprosy Relief Association, 433 (B.R.)
 British India, 174 (B.R.)

- Brotzu, G., with Ottolenghi, 649 (Mal.)
 Brown, H. W., with Ward & Lamson, 977 (Hel.)
 Brown, P. W., 785 (Am.)
 —, with Magath, 802 (Dys.)
 Browning, C. H., Cohen, J. B., Ellingworth, S. & Gulbrandsen, R., 235 (S.S.)
 Bruchan, N., with Bauvallet & Aguessy, (937) (Z.)
 Brug, S. L., 274 (Z.)
 —, Haga, J., van Joost, R. P. A. C. & Verbunt, J. A. M., 1009 (Lep.)
 Brulé, M. & Stéhélin, 120 (Lept.)
 Brumpt, E., 268 (Z.), 464, 465, (473) (Hel.)
 Bruni, R. M. E., 414 (Hel.)
 Brussin, A. M., 234 (S.S.)
 Bruynoghe, R. & Vassiliadis, P., 280 (Z.)
 Buchanan, G. S., 496 (Y.F.)
 Buchanan, J. C. R., 224 *bis* (S.S.)
 de Buck, A., Schoute, E. & Swellengrebel, N. H., 647 (Mal.), 910 (Z.)
 —, with Swellengrebel & Schoute, 304 (Z.)
 Buckley, J. J. C. & Clapham, P. A., 447 (Hel.)
 Buddle, R., 359, 936 (Z.)
 de Buen, E., 307, 309, 909 (Z.)
 de Buen, S., 104 (K.A.)
 Bulletin Office International d'Hygiène Publique, (10) (Pl.), 32 (Misc.), 329 (Lep.)
 Bulletin of the Rubber Growers' Association, 585 (Misc.)
 von Bülow, T., 418 (Hel.)
 Burke, A. M. B., 589 (Misc.)
 Burke, A. W., with Shannon & Davis, 905 (Z.)
 Burnier, J. P., 22 (Oph.)
 Burowa, L. F., 613 (K.A.), 803 (Dys.)
 Businco, O., (220) (Mal.)
 Buss, G., 100, 623 (K.A.)
 Bussion, B., 254, 746 *bis*, 748, 752 (Rab.)
 Butler, C. S., 720 (Y. & S.)
 Butler, G. G., 942 (Lab.)
 Buxton, P. A., 56 (Misc.)
- C**
- Cacciapuoti, G., 660 *bis* (Mal.)
 Cairo, 778 (B.R.)
 Caius, J. F. & Naidu, B. P. B., 734 (Pl.)
 Calalb, G., 397 (Dys.)
 Calcutta, 946, 947 (B.R.)
 Calderini, M., 255 (Rab.)
 Caldwell, F. C. & Caldwell, E. L., 981 (Hel.)
 Califano, L. & Gritti, P., 854 (S.S.)
 Callan, A. M., with Lynch, 546 (Und.)
 Cameron, T. W. M., 49 (Misc.), 267 (Z.), 983 (Hel.)
 Caminopetros, J., with Blanc, 146 *bis* (Fev.), 309 (Z.)
 Campbell, H. E., (130) (R.B.F.)
 —, with Faust & Kellogg, (993) (Hel.)
 Campbell, W., 782 (Am.)
 Campos, E. de S., 248, 840 *bis* (S.S.)
 Canaan, T., 99 (K.A.), 336 (Lep.)
 Cannon, A., 759, 760 (Bb.)
 Cantani, F., 137 *bis* (Und.), 472, 970 (Hel.)
 Capri, M., with Dorogan, 777 (Pel.)
 de Capua, F., 96, 619 (K.A.)
 Carda, P., with Angolotti, 243 (S.S.)
 Cargill, L. V., 1013 (Oph.)
- Carley, P. S., 776 (Pel.)
 Carman, J. A., 954 (Hel.)
 Carmouze, 327 (Lep.)
 Carneiro, H., (937) (Z.)
 Carpano, M., 885 (Z.)
 Carpenter, C. M. & Boak, R., 545 (Und.)
 Carpenter, G. D. H., (250), 809 (S.S.)
 Carral, G. & Chainet, P., 700 (R.F.)
 Carrión, A. L., 516 (Der.), 919 (Z.)
 Carrosse & Barnéoud, 455 (Hel.)
 Carter, H. F., 295 (Z.)
 Cartron, I (Pl.)
 Carvaille, R., with Deschiens, 174 (B.R.)
 Carvalho, M. G., 256 (Rab.)
 Cash, J. R. & Hu, C. H., 609, 610 (K.A.)
 Cassimatis, C., 502 (Oph.)
 Castellani, A., 67 (Misc.), 395 (Dys.), 1021 (Sp.)
 — & Duval, C. W., (530) (Der.)
 Castellano, T., Orgaz, J. & Luque, F., 967 (Hel.)
 de Castro, A., 862 (B.R.)
 de Castro, A. M. & Gomes, L. S., 333 (Lep.)
 Catanei, A., 514, 516, 517, (530) (Der.)
 —, with Sergeant, Edm. & Sergeant, Et., 893 (Z.)
 Catanié, with Remlinger & Bailly, 699 (R.F.)
 Cattaneo, L., 704 (Lept.)
 Cauvin, with Delpy & Riou, 744 (Rab.)
 Cawadas, E., 206 (Mal.)
 Cawston, F. G., 66, 172 (Misc.), 461, 465, 466, (473), 962, 963 (Hel.)
 Cazanove, I (Pl.)
 Cazanove, F., 3 (Pl.), 475 *bis* (Y.F.)
 Céard, L., 105 (K.A.)
 Cerqua, S., 461 (Hel.)
 Cerza, L., 617 (K.A.)
 Chacón, A. L., 100 (K.A.)
 Chadwick, C. R., with Mills & Machattie, 620 (K.A.)
 Chagas, 837 (S.S.)
 Chagas, E., 838, 839, (854) (S.S.)
 Chainet, P., with Carral, 700 (R.F.)
 Chambon, with Jamot, 825 (S.S.)
 Chandler, A. C., 264 (B.R.)
 Charles, J. A. & Warren, S. H., 393 (Dys.)
 Chatterjee, J. C., (21) (Chl.)
 Chatterji, K. K., 467 (Hel.)
 Chavarria, A. P. & Nauck, E. G., 161 (Misc.)
 Cheer, S. N., with Robertson, 863 (B.R.)
 Chen, F., with Frazier, 1002 (Lep.)
 Ch'en, K. T., with Yang, 619 (K.A.)
 Cherefeddin, O., 393 (Am.)
 Chesneau, P., 501, 1010 *bis* (Oph.), 955 (Hel.)
 —, with Bedier, 960 (Hel.)
 — & Tran-van-Manh, 914 (Z.)
 Chesterman, C. C., 85 (B.R.)
 Chevallier, P., 202 (Mal.)
 — & Schwob, R., 202 (Mal.)
 Chiari, H., 984 (Hel.)
 Chiasserini, A., 470 (Hel.)
 Chia-Swee, with Wu Lien-Teh, Pollitzer & Jettmar, 2 (Pl.)
 Chiba, E., with Kobayashi & Furuyama, 439 (Hel.)
 —, with Tanabe, 391 (Am.)
 Chinaglia, A., with Balbi, 117 (R.F.)
 China Medical Journal, 994 (Lep.)
 Chitre, G. D., with Mackie, 349 (Sp.)
 —, with Webster, 731 (Pl.)

- Chodoukine, N. I., 98 (K.A.), 272 (Z.)
 Chodukin, N. I., 620 (K.A.)
 Chodukin, N. J., with Pawlowsky, 323 (Z.)
 Choisser, R. M., 587 (Misc.), 709 (Y. & S.)
 Chopra, R. N., with Acton, 184 (Mal.), 388 (Am.), 609 (K.A.)
 — & Choudhury, S. G., 98 (K.A.)
 — & De, N. N., 569 (Misc.), 615 (K.A.)
 —, Ghosh, N. N. & Ratnagiriswaran, A. N., 65 (Misc.)
 — & Ghosh, S., 65, 568 (Misc.)
 —, Gupta, J. C. & Basu, N. K., 611 (K.A.)
 — & Mukherjee, B. P., 616 (K.A.)
 Chorine, V. & Baranoff, N., 308 (Z.)
 —, with Marchoux, 701 (R.F.)
 Chorley, J. K., 314 *bis* (Z.)
 Choudhury, B. K. P., with Morison & Rahman, 855 (Chl.)
 Choudhury, K. L., with Strickland, & others, 666 (Mal.)
 Choudhury, S. G., with Chopra, 98 (K.A.)
 Choudoukine, N. J., 906 (Z.)
 Chowdhury, K. L., with Strickland, 903 (Z.)
 Christenson, R. O. & Greene, W. P., 459 (Hel.)
 —, with Riley, 689 (B.R.)
 Christophers, S. R., 183 (Mal.), 574 *ter* (Misc.)
 Christopherson, J. B., 44, 67 (Misc.)
 Chu, C. K., with Kurotchkin, 532 (Myc.)
 Chuan, L. T., with Takahashi, To, Tsuchiya & Abiko, 9 (Pl.)
 —, with Tsuchiya, 733 (Pl.)
 Ciarrocchi, L., 64 (Misc.)
 Cicinnati, A. & Denes, G., 291 (Z.)
 Ciferri, R., 519 (Der.)
 Cilentio, R. W. & Baldwin, A. H., 629 (Mal.)
 —, with Hermant, 1025 (B.R.)
 Ciotola, A., 80 (Misc.)
 Cipriani, P. F., 444 (Hel.)
 Ciuca, M., Ballif, L., Vieru, M. & Stirbu, A., 203 (Mal.)
 Claassens, J. D. M., 782 (Am.)
 Clapham, P. A., with Buckley, 447 (Hel.)
 Clark, H. C., 61 (Misc.), 358 *ter*, 886 (Z.)
 Clarke, T., 634 (Mal.)
 Claxton, E. E., 163 (Misc.)
 Clayton, F. H. A. & Warren, S. H., 397 (Dys.)
 Clearkin, P. A., 366, 942 (Lab.)
 Cleland, J. B., 139 (Fev.)
 Clément, 267 (Z.)
 Clemesha, W. A., 181 (Mal.)
 Cleveland, L. R. & Sanders, E. P., 887 (Z.)
 Cloitre, J., 76 (Misc.), 1010, 1013 (Oph.)
 Cluver, E. H., 766 (Pel.)
 Cochrane, R. G., 325, 337, 1009 (Lep.), 354 (B.R.)
 Coghlan, B. A., 229 (S.S.)
 Coglievina, B., 152 (Fev.)
 Cohen, A. J., with Rodenwaldt, 550 (Und.)
 Cohen, J. B., with Browning, Ellingworth & Gulbransen, 235 (S.S.)
 Colas-Belcour, J., 324 *bis* (Z.)
 —, with Nicolle & Anderson, 107, 692 *bis* (R.F.)
 —, with Roubaud, 310 (Z.)
 Cole, H. I., 335 *bis* (Lep.)
 Collado, J. G., 306 (Z.)
 Collart, A., with Schwetz & Fornara, 731 (Pl.)
 Collier, W. A., 51 (Misc.), 835 (S.S.)
 — & Krause, M., 232, 835 (S.S.)
 Collin, L., 503 (Oph.)
 Collins, B. J., with Stiles, 920 (Z.)
 Colombani, (10) (Pl.)
 Comaroff, R., with Kligler & Geiger, 241 (S.S.)
 Commonwealth of Australia, 599 (Misc.)
 Compton, A., 396 (Dys.), 735 (Pl.)
 Connal, A., 939 (Lab.)
 —, Paisley, J. C., Elmes, B. G. T. & Bowrey, R., 9 (Pl.)
 Connell, W. K., 387 (Am.)
 Connor, F. P., 45 (Misc.), 467 (Hel.)
 Cooke, F. H., 995 (Lep.)
 Coonoor, Southern India, Pasteur Institute, 750 (Rab.)
 Cooper, G. W., (937) (Z.)
 Conseil, E., with Nicolle & Durand, 735 (Pl.)
 Coppinger, W. V., 26 (Oph.)
 Cordier, V. & Morenas, L., 786 (Am.)
 Coria, N. A., with Glaser, 886 (Z.)
 Corkill, N. L., 969 (Hel.)
 Corradetti, A., (937) (Z.)
 Correia, A. C. G. da S., (10) (Pl.), 12 (Chl.), 594 (Misc.)
 Corson, J. F., 815 (S.S.)
 Cort, W. W., Otto, G. F. & Spindler, L. A., 973 (Hel.)
 —, Schapiro, L., Riley, W. A. & Stoll, N. R., 440 (Hel.)
 —, — & Stoll, N. R., 421 (Hel.)
 —, Stoll, N. R., Sweet, W. C., Riley, W. A. & Schapiro, L., 431 (B.R.)
 Cortés, A. F., 92 (K.A.)
 da Costa, J. J. G., with Jolly & Shoung, 856 (Chl.)
 Costa-Mandry, O., with Weiss, Landron, & Wilkes-Weiss, 353 (Sp.)
 Costantini, H., 387 (Am.)
 Costantino, S., 612 (K.A.)
 Coulon, G., 292 (Z.)
 Coutelen, F., (474), 985, 990 (Hel.)
 Covell, G., with Barraud, 897 (Z.)
 Cowan, J. M., 571 (Misc.)
 Cowdry, E. V. & Kitchen, S. F., 475 (Y.F.)
 Craig, C. F., 381, 391 (Am.)
 Craighead, A. C., with Shortt, Smith, d'Silva & Das, 616 (K.A.)
 —, with —, — & Swaminath, 95, 604 *bis*, 605 (K.A.)
 Crebbin, A. R., 28 (Oph.)
 Crichtlow, N., 596 (Misc.)
 Crimmins, M. L., 359 (Z.)
 Crouch, J. H., 22 (Oph.)
 Cruickshank, M. M., 1010 (Oph.)
 Cruikshank, A. G., 65 (Misc.)
 Cruz, J. da C., 478, 480, 868 *bis* (Y.F.)
 da Cruz, L. J. C., with de Mello, (406) (Dys.)
 Cuboni, E., 112, 699 *bis* (R.F.), 970 (Hel.)
 Cuénod & Roger-Nataf, 27 (Oph.)
 Cummins, S. L. & Le Roux, J. J. du P., 1005 (Lep.)
 da Cunha, A. M., 153 (Fev.)
 — & Muniz, J., 272, 290 *bis* (Z.), 492 (Y.F.)
 Cunningham, J., 63 (Misc.)
 — & Malone, R. H., 742 (Rab.)
 —, Nicholas, M. J. & Lahiri, B. N., 746 (Rab.)
 Curasson, G., 291 (Z.)
 Curson, H. H., 817 (S.S.)
 Curth, W., with West, 525 (Der.)

Cutler, J. T., with Minot, 569 (Misc.)
Czarkowska, J. & Blank-Weissbeg, S., 699 (R.F.)

D

Daco, 31 (Misc.)
Dalrymple-Champneys, W., 511 (B.R.), 538 (Und.)
Damas Mora, A., 34 (Misc.)
Damon, S. R. & Hampil, B., 122 (Lept.)
Danzel, L., 574 (Misc.)
Darling, G. B., Jr., 261 (Rab.)
Das, S., with Shortt, Craighead, Smith & d'Silva, 616 (K.A.)
Davey, T. H., with Gordon, 813 (S.S.)
Davis, N. C., 488, 874 (Y.F.)
— & Shannon, R. C., 482, 484 bis (Y.F.)
—, with —, 905 (Z.)
—, with — & Burke, 905 (Z.)
Dayrit, A., with Pineda, E. V. & Pineda, E. R., 679 (Lep.)
Dchaparidse, P., 59 (Misc.)
De, N. N., with Chopra, 615 (K.A.)
De, P., with Chopra, 569 (Misc.)
Debenedetti, R., with de Lavergne & Abel, 786 (Am.)
—, with — & Melnotte, 794, 795 (Dys.)
Decchi-Declich, M. & Favia, N., 135 (Und.)
Deeks, W. E., 187 (Mal.)
Delacroix, M. J. R., 785 (Am.)
Delamare, G., 693, 694 (R.F.)
— & Gatti, C., 520, 522 (Der.)
Delance, E., 24 (Oph.), 681 (Lep.)
Delanoe, P., 106 bis, 692 (R.F.), 521 bis (Der.)
Del Favero, E., 992 (Hel.)
Dell'Aquila, T., 782 (Am.)
Delpy, J. J. P., with Epaulard & Hornus, 39 (Misc.)
Delpy, L., Cauvin & Riou, 744 (Rab.)
Del Rosario, F. T., with Velasco, Alonso, Limkako & Fernandez, 334 (Lep.)
Demaria, A. & Gallinato, V., 918 (Z.)
Demina, N. A., with Schourenkova, 279 (Z.)
—, with — & Pavlova, 913 (Z.)
Denes, G., with Cicinnati, 291 (Z.)
Denney, O. E., 673 (Lep.)
—, Hopkins, R. & Johansen, F. A., 673 (Lep.)
—, with — & —, 676 (Lep.)
Dérôt, M., with Sézary & Guédé, 336 (Lep.)
Deschiens, R., 270, 275 (Z.)
— & Carvaillo, R., 174 (B.R.)
— & Kipchidzé, N., 277 (Z.), 791 (Am.)
Dévé, F., 968, 969 (Hel.)
— & Lessertisseur, M., 969 (Hel.)
Dewar, M. M., with Wayson & Badger, 340 (Lep.)
Dhruv, J. D., 72 (Misc.)
Dikmans, G., 407 (Hel.)
Dimitrakoff, K., (803) (Am.)
Dimitrijević-Speth, V. & Magovcević-Schneider, D., (405) (Dys.)
Dinger, J. E., 486 (Y.F.)
—, Schüffner, W. A. P., Snijders, E. P. & Swellengrebel, N. H., 485, 486, 869, 870 (Y.F.)
Dinulescu, G., 317 bis (Z.)
Dios, R., Werngren, E. T. & Perez, P., 842 (S.S.)

Dixey, M. B. D., 995 (Lep.)
Dixon, D. S., with Low, 1024 (Sp.)
Dizon, E. Y., 1000 (Lep.)
Djaparidse, P., 774 (Pel.)
Dobell, C., with Bishop, A., 389 (Am.)
Dobrovol'skaia-Zavad'skaia, N. & Kobozieff, N., 984 (Hel.)
Doerr, R. & Schmidt, G. W., 980 (Hel.)
Dolloff, A. F., 927 (Z.)
Donaldson, R. S., 326 (Lep.)
Donath, W. F., with Jansen, 764 (Bb.)
Donatien, A., with Sergeant, Edm., Parrot & Lestoquard, 289 (Z.)
Donayre, A., 890 (Z.)
Donnison, C. P., 73, 162 (Misc.)
Donomae, I., 126 (Lept.)
Doorenbos, W., 730, 737 (Pl.)
Doornbos, W. H., with Swellengrebel, 302 (Z.)
Dorogan, D. & Capri, M., 777 (Pel.)
Dostrowsky, A., 101 (K.A.), 774 (Pel.)
Doubrow, with Garin & Mounier, 414, 428 (Hel.)
Dougherty, M. S., 780 (Am.)
Dove, W. E., with White, 426 (Hel.)
Dover, C., 904 (Z.)
Dracoulides, N., 142 (Fev.)
van Driel, B. M., 595 (Misc.)
Dubocceage, 592 (Misc.)
Dubois, A., 822, 829 (S.S.)
Dubrowski, S. B., Kranzfeld, A. M., Rosenfeld, W. D. & Salamandra, E. G., 415, 442 (Hel.)
Dudley, S. F., with MacArthur & Whittingham, 148, (556) (Fev.)
Duffau, 131 (Und.)
Duggan, J. N., 25 (Oph.)
Duhig, J. V., 361 (Z.)
Duke, H. L., 846, 847 (S.S.)
Dukelsky, O. & Golubewa, E., 469 (Hel.)
Duncan, J. T., 538 (Und.)
Dunn, C. L., (21) (Chl.)
— & Khan, S., 14 (Chl.)
Dunn, L. H., 293 (Z.)
Dunn, T. B., 378 (Am.)
Durand, P., with Nicolle & Conseil, 735 (Pl.)
Duren, 580, 581 (Misc.)
Durieux, C. & Sall, M., 192 (Mal.)
Duval, C. W., with Castellani, (530) (Der.)
Dwijikoff, P. P. & Bogoslawskij, W. N., 253 (Rab.)
Dyar, H. G., 312 (Z.)

E

Eades, T., with Kellaway, 355 (Z.)
Eddie, B., with Meyer, 545, 546 (Und.)
Edwards, F. W., 309, 311 (Z.)
—, with Paine, 301 (Z.)
Egypt, 366 (Lab.)
Eidinow, A., 934 (Z.)
Eisenberg, with Ruge, Lohfeldt, Knabe & Kunert, 214 (Mal.)
Eisenklam, I., 967 (Hel.)
Ejercito, A., 217, (220) (Mal.)
Ekblom, T., 310 (Z.)
Eliseo Montaña, (342) (Lep.)
Ellenbogen, V., with Giemsa, 837 (S.S.)
Ellett, E. C. & Rychener, R. O., 27 (Oph.)

- Ellingworth, S., with Browning, Cohen & Gulbrandsen, 235 (S.S.)
 Elliot, R. H., 504 (Oph.)
 Ellis, R. W. B., 776 (Pel.)
 Elmes, B. G. T., with Connal, Paisley & Bowrey, 9 (Pl.)
 Emile-Weil, P., with Grégoire, 71 (Misc.)
 Emily, J., 882 (Z.)
 Engineering News Record, 925 (Z.)
 Engler, A., with Launoy, 832 *bis* (S.S.)
 Epaulard, A., Hornus, P. P. & Delpy, J. J. P., 39 (Misc.)
 Epstein, H. & Tarassow, S., 119 (Lept.)
 Eristawi, K., 473 (Hel.)
 Escalar, G., with Pecori, 195 (Mal.)
 Escomel, E., 152 (Fev.), 1031, 1032 (B.R.)
 Essex, H. E., with Feldman, 454 (Hel.)
 — & Markowitz, J., 932 *bis* (Z.)
 Estival, G., 935 (Z.)
 Eubanas, F., 333, 679, 1002 (Lep.)
 Eustatziu, G. & Ionesco, V., 860 (Mal.)
 Evans, A. M., 307 (Z.), 485 (Y.F.)
 —, with Patton, 177 (B.R.)
 Eykman, C., 83 (Misc.)
- F**
- Fabre, H. J. A., 441 (Hel.)
 Fabre, J. A., 591 (Misc.)
 Fairley, K. D. & Fairley, N. H., 454 (Hel.)
 —, — & Williams, F. E., 470 (Hel.)
 Fairley, N. H., 1018 (Sp.)
 —, with Fairley, K. D., 454 (Hel.)
 — & Jasudasan, F., 351 (Sp.)
 —, with Kellaway & Williams, 970 (Hel.)
 —, with Mackie & Staff of the Haffkine Institute, 343 (Sp.)
 Falleroni, D., 196 (Mal.)
 Famulari, S., (474) (Hel.)
 Fanano, V., 98 (K.A.)
 Far Eastern Association of Tropical Medicine, 179 (Mal.), 326 (Lep.), 608 (K.A.), 728 (Pl.), 756 (Bb.), 897 (Z.)
 Fasiani, G. M. & Oselladore, G., 534 (Myc.)
 Faust, E. C., 265 (B.R.), 301, 883, 886, 894 (Z.), 780 (Am.), 967 *bis* (Hel.)
 —, Campbell, H. E. & Kellogg, C. R., (993) (Hel.)
 — & Maxwell, T. A., 920 (Z.)
 Favia, N., with Dechigi-Declich, 135 (Und.)
 Favilli, G., 132, 547 (Und.)
 Federated Malay States, 193, 194 (Mal.), 372 (Lab.)
 Feegrade, E. S., 299, 306 (Z.)
 Feldman, W. H. & Essex, H. E., 454 (Hel.)
 Ferguson, A. L., with Pirie & Retief, 427 (Hel.)
 Ferguson, H. R. M., 1014 (Oph.)
 Fermi, C., 258, 259 (Rab.)
 Fernandez, F. M., (600) (Misc.)
 Fernandez, G., with Velasco, Alonso, Limkako & Del Rosario, 334 (Lep.)
 Fernandez, J. M. M., with Fidanza & Schujman, 680 (Lep.)
 Ferrão, P., 206 (Mal.)
 Ferrari, A., (937) (Z.)
 Ferruccio, C. R., with Siro, 671 (Lep.)
 Fialho, with de Mello, (117) (R.F.)
 Fialho, A., with Jakob & Villela, 869 (Y.F.)
 —, with Pacheco, 404 (Dys.)
- Fichera, S. & Maugeri, F., 550 (Und.)
 Fidanza, E. P., Fernandez, J. M. M. & Schujman, S., 680 (Lep.)
 Figueiredo, B., with Penna, 477, 868 (Y.F.)
 Fiji Annual Medical and Health Report, 678 (Lep.)
 Findlay, G. M., 1029 (B.R.)
 —, with Hindle, 872 (Y.F.)
 Fine, J., with Blacklock & Gordon, 880 (Z.)
 Finkelstein, M. H., 858 (Chl.)
 Finocchio, M., with Volpino, 750 (Rab.)
 Fiorentini, A., 210 (Mal.), 616 (K.A.)
 Fischer, O. & Kunert, H., 828 (S.S.)
 Fischer, W. O., 428 (Hel.), 586 (Misc.)
 — & Orenstein, A. J., 408 (Hel.)
 Fischl, V., 128 (R.B.F.), 836 (S.S.)
 — & Kussat, E., 852 (S.S.)
 Fitzgerald, R. D., (993) (Hel.)
 Fitzpatrick, S. C., 968 (Hel.)
 Florentin, P., with de Laverne, 126 (Lept.)
 Flu, P. C., 6, 7, 736 *ter*, 737 (Pl.), 53 (Misc.), 468 (Hel.)
 Foley, H. & Parrot, L., 323 (Z.)
 Fonquernie, I (Pl.)
 de Fonseca, F., 97 (K.A.)
 da Fonseca, O. & Leão, A. E. de A., 519 *bis* (Der.)
 Fontes, P., 329 (Lep.)
 Fontoyonot & Razafindralambo, 799 (Dys.)
 Fornara, L., with Schwetz, 852 (S.S.)
 —, with — & Collart, 731 (Pl.)
 Fournier, A., with Vigne, 102 (K.A.)
 Fox, H., 513 (Der.), 713 (Y. & S.)
 Fox, L. W., 23 (Oph.)
 Franchini, G., 167 (Misc.), 324 *bis*, 925 (Z.), (405) (Dys.), 435 (B R.), 683 (Lep.)
 Frank, A. W., 658 (Mal.)
 Fraser, A. M. & Smith, J., 793 (Dys.)
 —, with —, 793 (Dys.)
 Fraser, L., 360 (Z.)
 Frazier, C. N. & Chen, F., 1002 (Lep.)
 Freeman, L. B., 275 (Z.)
 Freeman, M., with Kellaway & Williams, 933 (Z.)
 Frei, W., 726, 727 (C.Bu.)
 de Freitas, H. B., 262 (Rab.)
 Frew, H. W. O., with Pratt, 792 (Dys.)
 Frew, J. G. H., 313 (Z.)
 Frèze, with Garnaudier, 555 (Fev.)
 Friede, K. A., with Kritschewski, 578 (Misc.)
 Friedrichs, A. V. & Harris, W. H., 390 (Am.)
 —, with —, 391 (Am.)
 Frobisher, M., Jr., 493 (Y.F.)
 —, with Sawyer, 494 (Y.F.)
 —, with —, Kitchen, & Lloyd, 487 (Y.F.)
 Fróes, H. P., 468 *ter* (Hel.)
 Froment, R., with Nicolas & Lacassagne, 775 (Pel.)
 Fujitsuna, S., 857 (Chl.)
 Fülleborn, F., 407, 425, 470 (Hel.)
 — & Kikuth, W., 956 *bis* (Hel.)
 Furuyama, T., with Kobayashi & Chiba, 439 (Hel.)
- G**
- Gabaldón, A., 277, 884 (Z.)
 Gabbi, U., *et al*, 1031 (B.R.)
 Gaisky, N. A., 5 (Pl.)
 Galliard, H., 246 *bis*, 841 *bis* (S.S.)

- Gallinato, V., with Demaria, 918 (Z.)
 Galstaun, S. G., 163 (Misc.)
 Gamble, W. G., Jr., 441 (Hel.)
 Ganora, R., 593 (Misc.)
 Gantt, V. C. & Ponomarev, A. V., 749 (Rab.)
 Gantt, W. H. & Ponomarew, A. W., 255 (Rab.)
 Garcia, F., with von Oettingen, 957 (Hel.)
 Garcia, O., 717 (Y. & S.)
 Garcia Espin, J., (405) (Dys.)
 Gardner, G., 116 (R.F.)
 Gardner, S. M., with Lincoln, 535 (Myc.)
 Garfinkle, F. E., with Stanley & Goddard, 794 (Dys.)
 Garin, C., 139 (Fev.), 665 (Mal.)
 —, Doubrow & Mounier, 414, 428 (Hel.)
 Garnaudier & Fréze, 555 (Fev.)
 Garnham, P. C. C., 191 (Mal.)
 Gasperini, C. G., (148) (Fev.), (600) (Misc.), (937) (Z.)
 Gastaminza, U., 523 (Der.)
 Gaston, Olmer, J. & Amédéo, 393 (Am.)
 Gater, B. A. R. & Rajamoney, P. D., 303, 305 (Z.)
 Gatschetschiladse, J., 774 (Pel.)
 Gatti, C., with Delamare, 520, 522 (Der.)
 Gaud, M., 734 (Pl.)
 Gaulene, with Mesnard & Joyeux, 566 (Misc.)
 Geiger, A., with Kligler & Comaroff, 241 (S.S.)
 Gemar, F., 392 (Am.)
 Gendre, E., with Joyeux & Baer, (993) (Hel.)
 Geneeskundig Tijdschrift voor Nederlandsch-Indië, 373, 374, 945 (Lab.)
 Genevray, J., 955 (Hel.)
 George, P. V., with King, Iyer & Natarajan, 319 (Z.)
 —, with Pandit, Mankikar & Natarajan, 917 (Z.)
 Georgiewsky, A., 96 (K.A.)
 Ghetti, G., (117) (R.F.)
 Ghosh, B., with Sur, S. N., 190 (Mal.)
 Ghosh, H., 795 (Dys.)
 Ghosh, N. N., with Chopra & Ratnagiri-swaran, 65 (Misc.)
 Ghosh, S., with Chopra, 65, 568 (Misc.)
 Gibson, A. G., 690 (B.R.)
 Giemsa, G., 832 (S.S.)
 — & Ellenbogen, V., 837 (S.S.)
 Giglioli, G., 508 (B.R.), 525 (Der.), 564 *bis* (Misc.)
 Gill, C. A., 180, 634 (Mal.)
 Gill, C. W. H., 810, 823 (S.S.)
 Ginsburg, J. M., 582 (Misc.)
 —, with Peterson, 926 (Z.)
 Giordano, A. S., 539 (Und.)
 — & Sensenich, R. L., 539 (Und.)
 Giordano, M., 840 (S.S.), 862 (B.R.)
 Gioscffi, M., 927 (Z.)
 Girand, with Pinard, Rabut & Abricosoff, 341 (Lep.)
 Girges, R., 462 *quat.* (Hel.)
 Glaser, R. W. & Coria, N. A., 886 (Z.)
 Gley, P., with Richet, 232 (S.S.)
 Gloster, T. H., Beer, W. A., Nambiar, M. R. & Sastry, S. S., 259 (Rab.)
 Glusmann, M. P., Predtetschenskaja, L. A. & Ssolowjewa, J. W., 747 (Rab.)
 Gnanadikam, G. J., 29 (Oph.)
 Goro, E., 596 (Misc.)
 Godal, J., 599 (Misc.)
 Goddard, W. P., with Stanley & Garfinkle, 794 (Dys.)
 Godwin, D. E., 28 (Oph.)
 Goeckerman, W. H., Osterberg, A. E. & Sheard, C., 529 (Der.)
 Goelam, 595 (Misc.)
 Gokhale, S. K., with Sokhey, 343 (Sp.)
 Goldberger, J. & Wheeler, G. A., 776 (Pel.)
 Gold Coast, 363, 942 (Lab.), 716 *bis* (Y. & S.), 995 *bis* (Lep.)
 Golden, R., with O'Connor & Auchincloss, 986 (Hel.)
 Goldenberg, J., with Tzekhnovitzer, 252, 749 (Rab.)
 Goldie, H., 116 (R.F.), 403 (Dys.), 651, 659 (Mal.)
 Golow, D., with Iwanowsky, 739 (Pl.)
 Golubewa, E., with Dukelsky, 469 (Hel.)
 Gomes, J. M., 338, 683 (Lep.)
 — & Antunes, P. C. de A., 1005 *bis* (Lep.)
 Gomes, L. S., 494 (Y.F.)
 —, with de Castro, 333 (Lep.)
 Gomes, L. de S., with Piza, 703 (Lept.)
 González, E., 328 (Lep.)
 Goodale, R. H. & Krischner, H., 471 (Hel.)
 van Goor, J. M. N., 889 (Z.)
 Gordadse, G. & Kamalow, N., 443 (Hel.)
 Gordon, A. K., 70 (Misc.)
 Gordon, R. M. & Aidin, R., 813 (S.S.)
 —, with Blacklock & Fine, 880 (Z.)
 — & Davey, T. H., 813 (S.S.)
 — & Macdonald, G., 643 (Mal.)
 Gori, P., with Manieri, (117) (R.F.)
 Govindaradjassamy, with Labernadie, 1011 (Lep.)
 Goyle, (10) (Pl.)
 Grabow, C. & Struwe, F., 128 (R.B.F.)
 Gracey, D. I., 727 (C.Bu.)
 Graf, H., 225 (S.S.)
 Graham, J. D. (10) (Pl.), 638 (Mal.)
 Graham-Smith, G. S., 913 (Z.)
 Gray, J. D. A., 112 (R.F.)
 Gray, S. B. D., 65 (Misc.)
 Green, R., 194, 203, 654 (Mal.)
 Greene, W. P., with Christenson, 459 (Hel.)
 Greenway, D. F., 861 (B.R.)
 Gregg, A. L., with Bertwistle, 75 (Misc.)
 Grégoire, R. & Emile-Weil, P., 71 (Misc.)
 Gridnewa, W. M., 275 (Z.)
 Gritti, P., with Califano, 854 (S.S.)
 Groot, K. P., 165 (Misc.)
 Gross, R. D., 216 (Mal.)
 Grossi, G. & Balog, P., 532 (Myc.)
 —, with Balog, 531 (Myc.)
 Grund, J. L., 526 (Der.)
 Gubarew, E., with Iwanowsky & Golow, 739 (Pl.)
 Gubbay, R., 501 (Oph.)
 Gudger, E. W., 936 (Z.)
 Guédé, M., with Sézary & Dérot, 336 (Lep.)
 Guerin & Mattlet, 158 (Misc.)
 Guerra Méndez, R., (220) (Mal.)
 Guerrero, G. R., 328 (Lep.)
 Guha Thakurta, S. R., with Ukil, 857 (Chl.)
 Guilleman, A., 413 (Hel.)
 Guillermin, J., 762 (Bb.)
 Gulbransen, R., with Browning, Cohen & Ellingworth, 235 (S.S.)
 van Gulik, P. J., 467 (Hel.)

Gunn, J. A., 67 (Misc.)
 Gupta, B. M. D., 609 (K.A.)
 —, with Knowles & Acton, 59 (Misc.)
 —, with — & Basu, 110 (R.F.)
 Gupta, C. R. D., (220) (Mal.)
 —, with Napier, 607 (K.A.)
 Gupta, J. C., with Chopra & Basu, 611 (K.A.)
 Gupta, J. D., 15 (Chl.)
 Gupta, J. M. D., with Brahmachari, Banerjee
 & Basu, 613 (K.A.)
 Gupta, S. C. S., (220) (Mal.)
 Guthrie, R. H., 769 (Pel.)
 Gutmann, L., 752 (Rab.)
 Gwélessiany, J., 280 (Z.)

H

Haga, J., (937) (Z.)
 —, with Brug, van Joost & Verbunt, 1009
 (Lep.)
 Hahn, M. & Hirsch, J., 18 (Chl.)
 Hakki, I., 884 (Z.)
 Haldar, K. C., with Napier, 92 (K.A.)
 Hall, M. C. & Augustine, D. L., 420 (Hel.)
 Hallman, E. T., with Huddleson, 544 (Und.)
 Hamerton, A. E., 49 (Misc.)
 Hamet, H., 1024 (Sp.)
 Hamlyn-Harris, R., 581 (Misc.)
 Hampil, B., with Damon, 122 (Lept.)
 Hance, J. B., 1021 (Sp.)
 Hardy, A. V., Hudson, M. G. & Jordan, C. F.,
 543 (Und.)
 Harkness, A. H., 67 (Misc.)
 Harper, J., 463 (Hel.)
 Harris, D. L., 257 (Rab.)
 Harris, S. T., 317 (Z.)
 Harris, W. H. & Friedrichs, A. V., 391 (Am.)
 —, with —, 390 (Am.)
 Hartmann, E., 851 (S.S.)
 Harvey, D., 854 (S.S.)
 Hase, A., 920 (Z.)
 Hashiguchi, 719, 720 (Y. & S.)
 Haslam, J. F. C., 173, 266 (B.R.), 590 (Misc.)
 Hassanein, M. A., with Schütze, 8 (Pl.)
 Hasselmann, C. M. & Hasselmann-Kahlert,
 M., 208 (Mal.)
 Hasselmann-Kahlert, M., with Hasselmann,
 208 (Mal.)
 Hassler, E., (474) (Hel.)
 Hatt, P., 697 (R.F.)
 Häupl, C., 676 (Lep.)
 Hawe, A. J., 716 (Y. & S.)
 Hawley, H., with Megaw, 572 (Misc.)
 Hay, H. R., 394, 792 (Dys.)
 Hayes, T. H., 902 (Z.), 997 (Lep.)
 Health, Melbourne, 159 (Misc.)
 Hecht, O., 294, 309, 897, 912, (937) (Z.)
 Hecht-Eleda, M., 661 (Mal.)
 Hegglin, O., 977 (Hel.)
 Hegler, C., 540 (Und.)
 Hegner, R., 271, 276 (Z.)
 — & Schumaker, E., 273 (Z.)
 Heinemann, 83 (Misc.)
 Hellerström, S., 433 (B.R.), 726, 727 (C.Bu.)
 Helmy, M., with Augustine & Nazmi, 409
 (Hel.)
 Henderson, J. M., 326, 674 (Lep.)
 Henriques, J. F., 978 (Hel.)
 Henry, A. F. X., 211 (Mal.)
 Henry, E., 35 (Misc.)
 Herbert, H., 1014 (Oph.)
 d'Herelle, F., 558 (Misc.), 602 (B.R.), 728 (Pl.)
 —, Malone, R. H. & Lahiri, M. N., 558
bis (Misc.), 1026 (B.R.)
 Herivaux, A., 799 (Dys.)
 Hermans, E. H., 725 (C.Bu.)
 Hermant, P. & Cilento, R. W., 1026 (B.R.)
 Hermitte, L. C. D., 154 (Misc.)
 Hernandez, L. G., with Morales-Otero,
 1008 (Lep.)
 Hernandez Pacheco, D., 413 (Hel.)
 — & Pastor Botija, F., 444 (Hel.)
 Herrmann, O., 263 (Rab.)
 — & Korobkina, W., 653 (Mal.)
 — & Lifschitz, M., 650 (Mal.)
 Hertig, M. & Huang, T. F., 321 (Z.)
 —, with Young, 608, 611 (K.A.)
 —, with — & Liu, 94 (K.A.)
 Herzberg, K., with Manteufel, 877 (Y.F.)
 Hetherington, H. B. & Steenson, K. R., 169
 (Misc.)
 Heyd, C. G. & Sheplar, A. E., 781 (Am.)
 Higgins, M. E., 50 (Misc.)
 Hilgers, P., 397 (Dys.)
 Hill, R. B., 412 (Hel.)
 Hindle, E., 49 (Misc.), 495, 497 (Y.F.), 888 (Z.)
 — & Findlay, G. M., 872 (Y.F.)
 Hinman, E. H., with Matheson, 298, 901 (Z.)
 Hinshaw, H. C., 273 (Z.)
 Hirsch, J., with Hahn, 18 (Chl.)
 Hirschfelder, A. D. & Wright, H. N., 234 (S.S.)
 —, with —, 836 (S.S.)
 Hirst, L. F., with Vadivelu, K., 319 (Z.)
 Hoare, C. A., 282 (Z.)
 Hoepli, R., 447, (474) (Hel.), 618 (K.A.),
 726 *bis* (C.Bu.)
 —, Hsu, H. F. & Wu, H. W., 176 (B.R.)
 — & Regendanz, P., 850 (S.S.)
 —, with —, 225 (S.S.)
 Hoesch, K., 118 (Lept.)
 Hoffman, A. M., 134 (Und.)
 Hoffman, W. A. & Rivera, T., 452 (Hel.)
 Hoffmann, C. C., 899 (Z.), 991, 992 (Hel.)
 Hoffmann, W. H., 505, 1015 (Oph.), 937 (Z.),
 1001 (Lep.)
 — & Baez, P. R., 1000 (Lep.)
 Hoflin, J. W., 193 (Mal.)
 Hofstee, H. G., 62 (Misc.)
 Hogarth, A. M., 88 (B.R.)
 Hohenadel, B., with Kuczynski, 478, 877
 (Y.F.)
 —, with — & MacClure, 481 *bis*, 482
 (Y.F.)
 Holm, P., with Kristensen, 131 (Und.)
 Holmes, W. H. & Starr, P., 347 (Sp.)
 Hoolboom, L. E., 515 (Der.)
 Hooper, D., 210 (Mal.)
 Hooton, A., 600 (Misc.)
 Hopkins, R., Denney, O. E. & Johansen,
 F. A., 676 (Lep.)
 —, with — & —, 673 (Lep.)
 Horn, L. & Kauders, O., 215 (Mal.)
 Hornus, P. P., with Epaulard & Delpy, 39
 (Misc.)
 —, with Nicolle & Anderson, 106 (R.F.)
 Horta, P. de F. P., 518 (Der.)
 Hosoya, S., with Stefanopoulou, 706 (Lept.)
 Howard, A., 113 (R.F.)

Howells, W. M., 171 (Misc.)
 Howland, L. J., 901 (Z.)
 —, with Beattie, 296 (Z.)
 Hsu, H. F., with Hoeppli & Wu, 176 (B.R.)
 Hu, C. H. & Cash, J. R., 610 *bis* (K.A.)
 —, with —, 609, 610 (K.A.)
 — & Mu, J., 1007 (Lep.)
 Huang, T. F., with Hertig, 321 (Z.)
 Huddleson, I. F. & Hallman, E. T., 544 (Und.)
 Hudson, M. G., with Hardy & Jordan, 543 (Und.)
 Hudson, N. P., with Bauer, 866 (Y.F.)
 — & Philip, C. B., 489 (Y.F.)
 Huff, C. G., 310, 892 (Z.)
 Hughes, T. A. & Shrivastava, D. L., 652 (Mal.)
 Huie, D., with Mu, 97 (K.A.)
 Huinink, A. M. S. B., with Schuurman, 582 (Misc.), 893 (Z.)
 Huisman, B., 506 (Oph.)
 Huizinga, L. S., 331, 332 (Lep.)
 Hull, T. G., 262 (Rab.)
 Huppenbauer, C. B., 666 (Mal.)
 Hurwitz, E., 997 (Lep.)
 Husain, M. A., 66 (Misc.)

I

Iacono, I., 798 (Dys.)
 Ibrahim, A. B., 170 (Misc.)
 Ichok, G., 500 (Y.F.)
 Igersheimer & Bodenheimer, E., 111 (R.F.)
 Ignatiev, A. K. & Molodtsova, P. F., 320 (Z.)
 Imura, I., 11 (Chl.)
 Imura, Y., 2, 5 (Pl.)
 Imms, A. D., 293 (Z.)
 Imschenetzky, A., 529 (Der.)
 Indian Medical Gazette, 188 (Mal.)
 International Labour Review, 584 (Misc.)
 Ioff, I., 661 (Mal.), 919 (Z.)
 Ionesco, V., with Eustatziu, 660 (Mal.)
 Ionesco, D. & Teodosiu, T., 253 (Rab.)
 Isabolinski, M. P. & Zeitlin, A. J., 255 (Rab.)
 Ishii, S., 453 (Hel.)
 Ishikawa, S., 318 (Z.), 440 (Hel.), (803) (Dys.)
 Itabashi, K., 755 (Rab.)
 Iwanowsky, N., Gubarew, E. & Golow, D., 739 (Pl.)
 Iyengar, K. R. K., 750 (Rab.)
 Iyengar, M. O. T., 181 (Mal.), 307, 897, 898, 907, 908, (937) (Z.)
 — & Sur, P., 205 (Mal.)
 Iyer, M. A. K., 130 (R.B.F.)
 Iyer, P. V. S., with King, Natarajan & George, 319 (Z.)
 —, with Pandit, S. R. & Pandit, C. G., 989 (Hel.)

J

Jackson, D., 359 (Z.)
 Jackson, L. E., 925 (Z.)
 Jacocks, W. P., 410 (Hel.), 583 (Misc.)
 Jadassohn, W., 976 (Hel.)
 Jahnel, F. & Pentschew, A., 700 (R.F.)
 Jakimow, W. P., 111 (R.F.)
 Jakob, A., Fialho, A. & Villela, E. L., 869 (Y.F.)
 Jamaica, 591 (Misc.)

James, S. P., 179, 190, 626, 631, 663 *bis* (Mal.)
 — & Kauntze, W. H., 665 (Mal.)
 —, Nicol, W. D. & Shute, P. G., 181, 183 (Mal.)
 Jamot, E., 219 (Mal.), 222, 249 (S.S.)
 — & Chambon, 825 (S.S.)
 Jansen, B. C. P. & Donath, W. F., 764 (Bb.)
 Jantzen, W., 757 (Bb.)
 Jasudasan, F., with Fairley, 351 (Sp.)
 Jettmar, H. M., with Wu Lien-Teh, Pollitzer & Chia-Swee, 2 (Pl.)
 Jimenez, C. M., 523 (Der.)
 Jirovec, O., (937) (Z.)
 Joannides, G., with Blanc & Pangalos, 1005 (Lep.)
 —, with Kondoleon, 143 (Fev.)
 Johansen, F. A., with Denney & Hopkins, 673, 676 (Lep.)
 —, with Hopkins & Denney, 677 (Lep.)
 Johns, F. M., 779 (Am.)
 — & Tripoli, C. J., 380 (Am.)
 Johnson, W. B. & Lloyd, L., 811 (S.S.)
 Johnsson, V., (551) (Und.)
 Jolly, G. G. (600) (Misc.)
 Jolly, G., da Costa, J. J. G. & Shoung, A., 856 (Chl.)
 Jones, P. H. & Turner, R. H., 388 (Am.)
 van Joost, R. P. A. C., with Brug, Haga, & Verbunt, 1009 (Lep.)
 Jordan, C. F., with Hardy & Hudson, 543 (Und.)
 Jorge, R., 140 (Fev.), (879) (Y.F.)
 Jourdran, E., 11 (Chl.)
 Journal of the Medical Association of South Africa, 466 (Hel.)
 Joyeux, B., with Bablet, 745 (Rab.)
 —, with Mesnard & Gaulene, 566 (Misc.)
 Joyeux, C., 105 (K.A.)
 — & Baer, J. G., 964 (Hel.)
 —, Gendre, E. & Baer, J. G. (993) (Hel.)
 Judd, J. H., 505 (Oph.)
 Jung, J. S., with Naidu, 6, 728 (Pl.)
 Jung, S., with Naidu & Kamakaka, 740 (Pl.)
 Junior, M. da R., 395 (Dys.)
 Jurukoff, B., with Regendanz, 844 (S.S.)
 Justin-Besançon, L., with Labbé and Nepveux, 278 (Z.)

K

Kadletz, N. A. & Kusmina, L. A., 304 (Z.)
 Kagaya, K., 122, 123 (Lept.)
 Kairis, Z., 144 (Fev.)
 Kaiser, L., 904 (Z.), 998 (Lep.)
 Kaktin, A., with Weidemann, 329 (Lep.)
 Kalina, G., 4 (Pl.)
 Kamakaka, K. H., with Naidu & Jung, 740 (Pl.)
 Kamalow, N., with Gordadse, 443 (Hel.)
 Kamat, D. D. & Ranadive, V. Y., 326 (Lep.)
 Kandelaki, S., 148 (Fev.)
 Karamchandani, P. V., 622 (K.A.), 657 (Mal.)
 Kasakow, P. T., 966 (Hel.)
 Kasauli, Pasteur Inst. of India, 750 (Rab.)
 Kassirsky, J. A., 351 (Sp.)
 Katahira, J., 287 *bis* (Z.)
 Kauders, O., with Horn, 215 (Mal.)
 Kaufman, J. B., 755 (Rab.)

- Kauntze, W. H., 365 (Lab.)
 —, with James, 665 (Mal.)
 Kawamura, R., 464 (Hel.)
 Kawanishi, K., 427 (Hel.)
 Kayser, J. D., 602 (B.R.)
 Keefer, C. S., 763 (Bb.)
 —, Khaw, O. K. & Yang, C. S., 614 (K.A.)
 Keilin, D. & Nuttall, G. H. F., 921 (Z.)
 Kellaway, C. H., 355, 356 *bis*, 929, 935 (Z.), 451 (Hel.)
 —, & Eades, T., 355 (Z.)
 —, Fairley, N. H. & Williams, F. E., 970 (Hel.)
 —, Freeman, M. & Williams, F. E., 933 (Z.)
 —, & Williams, F. E., 356 (Z.)
 Kellogg, C. R., with Faust & Campbell, (993) (Hel.)
 Kendrick, J. F., 420 (Hel.)
 Kenya, 365 (Lab.)
 Kessel, J. F. & Mason, V. R., 800 (Dys.)
 Kessler, A., (474) (Hel.)
 Kesten, B. M., 513 (Der.)
 Khaiat, H., with Trabaud & Sabbagh, 394 (Dys.)
 Khaled, Z., 404 (Dys.)
 Khalil, M. & Betache, M. H., 460 (Hel.)
 —, & Salah El Din, M., 963 (Hel.)
 Khan, B. M., 307 (Z.)
 Khan, S., 16 *bis* (Chl.)
 —, & Agarwal, M. N., 20 (Chl.)
 —, with Dunn, 14 (Chl.)
 Khandehar, K. G., (530) (Der.)
 Khaw, O. K., 975 (Hel.)
 —, with Keefer & Yang, 614 (K.A.)
 Khouri, J., 382 (Am.), 458 *bis* (Hel.)
 Khoury, J., 783 (Am.)
 Kikuth, W., with Fülleborn, 956 *bis* (Hel.)
 —, & Regendanz, P., 579 (Misc.)
 King, C. H., with Barber, 217 (Mal.)
 King, G., with Pillat, 25 (Oph.)
 King, H. H., 369 (Lab.)
 —, Iyer, P. V. S., Natarajan, N. & George, P. V., 319 (Z.)
 King, W. G., 634 (Mal.)
 King, W. V., 200, 201 (Mal.)
 Kingsbury, A. N., 126 (Lept.)
 Kipschidse, N., 966 (Hel.)
 Kipchidzé, N., 891 (Z.)
 —, with Deschiens, 277 (Z.), 791 (Am.)
 Kiribayashi, S., 11 (Chl.)
 Kirschfeld, E. P., 330 *bis* (Lep.)
 Kirwan, E. O'G., 28 (Oph.)
 Kirwan, E. W. O'G., 503, 505 (Oph.)
 Kitchen, S. F., with Cowdry, 475 (Y.F.)
 —, with Sawyer, Frobisher, Jr. & Lloyd, 487 (Y.F.)
 Kleine, F. K. & Kroó, H., 558 (Misc.)
 Kligler, I. J., 147, 554 (Fev.), 240 (S.S.), 601 (B.R.)
 —, Geiger, A. & Comaroff, R., 241 (S.S.)
 Klotz, O., 200 (Mal.)
 Knabe, with Ruge, Lohfeldt, Eisenberg & Kunert, 214 (Mal.)
 Knap, C. R., 986 (Hel.)
 Knowles, R., 608 (K.A.), 635 (Mal.), (937) (Z.)
 —, Acton, H. W. & Gupta, B. M. D., 59 (Misc.)
 —, Gupta, B. M. D. & Basu, B. C., 110 (R.F.)
 Knutti, R. E., 253 (Rab.)
 Kobayashi, H., 898 (Z.)
 —, Chiba, E. & Furuyama, T., 439 (Hel.)
 Kobayashi, T., 416 (Hel.)
 Kobozieff, N., with Dobrovolskaia-Zavadskaja, 984 (Hel.)
 Koch, J., 254 (Rab.)
 Koike, T., 339, 685 (Lep.)
 Kokoris, D., 143 (Fev.)
 Komp, W. H. W., with Barber, 198, 199 *bis* (Mal.), 303 (Z.)
 —, with — & Newman, 188 (Mal.)
 Kondo, S. & Obana, K., 749 (Rab.)
 Kondoleon, E. & Joannides, G., 143 (Fev.)
 Konrich, F., 856 (Chl.)
 Konstansoff, S. W., 663 (Mal.)
 Kopciowska, L., with Nicolau, 251 (Rab.)
 Koppel, A., 727 (C.Bu.)
 Kopstein, F., 360 *bis* (Z.)
 Korke, V. T., 987 (Hel.)
 Korobkuna, W., with Herrmann, 653 (Mal.)
 Korobkova, E., 739 (Pl.)
 Korostelew, W. E., (600) (Misc.)
 Kortenhau, F., 446 (Hel.)
 Korteweg, P. C., 648 (Mal.)
 —, with Schüffner & Swellengrebel, 648 *bis* (Mal.)
 Kouwenaar, W., 54 (Misc.), 375 (Lab.)
 —, & Wolff, J. W., 707 (Lept.)
 Kranzfeld, A. M., with Dubrowinski, Rosenfeld & Salamandra, 415, 442 (Hel.)
 Krause, M., with Collier, 232, 835 (S.S.)
 Krischner, H., with Goodale, 471 (Hel.)
 Krishnamurty, C., 402 (Dys.)
 Kristensen, M. & Holm, P., 131 (Und.)
 Kritschewski, I. L., Baskin, M. M. & Lebedjeva, M. N., 578 (Misc.)
 —, & Friede, K. A., 578 (Misc.)
 —, & Rubinstein, P. L., 577 (Misc.)
 —, & Schapiro, S. L., 578 (Misc.)
 Kroó, H., with Kleine, 558 (Misc.)
 Krouch, M., with Villam, (220) (Mal.)
 Krukow, A. N., 958 (Hel.)
 Kuczynski, 480 (Y.F.)
 Kuczynski, M. H., 86 (B.R.)
 —, & Hohenadel, B., 478, 877 (Y.F.)
 —, —, & MacClure, E., 481 *bis*, 482 (Y.F.)
 Kudo, R., 289, 894 (Z.)
 Kumm, H. W., 302 (Z.)
 Kunert, H., with Fischer, 828 (S.S.)
 Kunert, with Ruge, Lohfeldt, Knabe & Eisenberg, 214 (Mal.)
 Kurauchi, K., 732 (Pl.), 883 (Z.)
 Kurotchkin, T. J., & Chu, C. K., 532 (Myc.)
 Kusmina, L. A., with Kadletz, 304 (Z.)
 Kussat, E., with Fischl, 852 (S.S.)
 Ku Yue Chi, (993) (Hel.)
 Kyriasis, K. N., 144 (Fev.)
 Kyriazides, N., 144 (Fev.)

L

- Labbé, M., Nepveux, F. & Justin-Besançon, L., 278 (Z.)
 Labernadie, V., 335, 999, 1004 (Lep.), 450 (Hel.)
 —, with André, 617 (K.A.)
 —, with Aubin, 999 (Lep.)
 —, & Govindaradjassamy, 1011 (Oph.)

- Labernadie, V. & Marneffe, H., 441 (Hel.)
 — & Srinivassane, 1009 (Lep.)
 Labernadie, V. G. F., 155 (Misc.)
 —, with Borel, 311 (Z.)
 Labranca, A., (220) (Mal.)
 Lacassagne, with Nicolas & Froment, 775 (Pel.)
 La Face, L., 302 (Z.)
 Laffont, Binet & Lesini, 662 (Mal.)
 Lahiri, B. N., with Cunningham & Nicholas, 746 (Rab.)
 Lahiri, M. N., with Malone & d'Herelle, 1026 (B.R.)
 Lahiry, M. N., with d'Herelle & Malone, 558 *bis* (Misc.)
 Laigret, J., 992 (Hel.)
 Lal, N., 932 (Z.)
 Lallemand, M. A., 411 (Hel.)
 Lambert, S. M., 57 (Misc.), 710 (Y. & S.)
 Lamborn, W. A., 294 (Z.)
 Lampe, P. H. J., 332 (Lep.)
 — & Simons, C., 672 (Lep.)
 Lamson, P. D., Robbins, B. H. & Ward, C. B., 418 (Hel.)
 —, Ward, C. B. & Brown, H. W., 977 (Hel.)
 Landron, F., with Weiss, 350 (Sp.)
 —, with —, Costa-Mandry & Wilkes-Weiss, 353 (Sp.)
 Lang, M. C., 1004 (Lep.)
 Langeron, J., with van Nitsen, (406) (Dys.)
 Langeron, M., 517, 520, 523 (Der.)
 de Langibaudière, B. & Than-Trong-Phuoc, 785 (Am.)
 Lanzoni, A., 39 (Misc.)
 Lara, C. B., 334 (Lep.)
 — & Nicolas, C., 334 (Lep.)
 —, with de Vera, 335 (Lep.)
 Large, D. T. M., 401 (Dys.)
 Larsen, A. M., 755 (Rab.)
 Lasnet, I., 2 (Pl.), 11 (Chl.)
 Lathbury, E. B., (937) (Z.)
 Latyschew, N. I., 646 (Mal.)
 Launoy, L. & Engler, A., 832 *bis* (S.S.)
 —, Nicolle, P. & Prieur, M., 231, 834 (S.S.)
 — & Prieur, M., 833 *bis* (S.S.)
 de Lavergne, V., Abel, E. & Debenedetti, R., 786 (Am.)
 — & Florentin, P., 126 (Lept.)
 —, Melnotte, P. & Debenedetti, R., 794, 795 (Dys.)
 Law, F. W., 25 (Oph.)
 Lawson, G. B., 318 (Z.)
 League of Nations, 221 (S.S.)
 Leão, A. E. de A., with da Fonseca, 519 *bis* (Der.)
 Lebedjeva, M. N., with Kritschewski & Baskin, 578 (Misc.)
 Le Bourdellès, B. & Liégeois, R., 212 *bis* (Mal.)
 Ledentu, G., 815 (S.S.)
 Lee, C. U., with Macgregor, 299 (Z.)
 Lee, S., 402 (Dys.)
 Lee, Y. S., 785 (Am.)
 Lefrou, G., I, (10), 733 (Pl.)
 Le Gac, 438 (Hel.), 500 (Y.F.), 686 (Lep.), 843 (S.S.)
 Legendre, F., 580 (Misc.)
 Legendre, F. M. A., 644 (Mal.)
 Legendre, J., 141 (Fev.), 161, 580, 585 (Misc.), 813, 902 (Z.)
 Leger, A., 745 (Rab.)
 Leger, M., 458 (Hel.), (600) (Misc.), 855 (Chl.)
 Leiper, R. T., 953 (Hel.)
 Leitch, J. N., 583 (Misc.), 974 (Hel.), 1032 (B.R.)
 — & Watson, M., 948 (B.R.)
 Lenskaya, G. N., with Bezsonova, 738 (Pl.)
 Lentz, W. J., with Barnes & Metcalfe, 754 (Rab.)
 Leon, R., 711 (Y. & S.)
 Leon-Kindberg, with Troisier & Monnerot-Dumaine, 119 (Lept.)
 Lépine, P., with Levaditi, Sanchis-Bayarri & Schoen, 283, 285 (Z.)
 —, with — & Schoen, 251 (Rab.)
 Leprosy in India, 670, 994 (Lep.)
 Leprosy Notes, 327 (Lep.)
 Leprosy Review, 327, 668, 994 (Lep.)
 Le Roux, J. J. du P., with Cummins, 1005 (Lep.)
 Le Roy des Barres, A., 46, 166 (Misc.), 681 (Lep.)
 Lesini, with Laffont & Binet, 662 (Mal.)
 Lesne, P., 315 (Z.)
 Lessertisseur, M., with Dévé, 969 (Hel.)
 Lestoquard, F., with Sergeant, Edm., Donatien & Parrot, 289 (Z.)
 Leupold, F., 231 (S.S.)
 Levaditi, C., Anderson, T., Selbie, F. R. & Schoen, R., 695 (R.F.)
 —, Lépine, P. & Schoen, R., 251 (Rab.)
 —, with Sanchis-Bayarri, V., Lépine, P. & Schoen, R., 283, 285 (Z.)
 Levinson, L. B., 244 (S.S.)
 — & Romanowa, K. G., 837 (S.S.)
 —, with Roskin, 694 (R.F.)
 Lewis, P. A., 871 (Y.F.)
 Lewitzki, R. G., with Bogojawlenski, 446 (Hel.)
 Li, H. C., 963 (Hel.)
 Lie, H. P., 1001 (Lep.)
 Liégeois, R., with Le Bourdellès, 212 *bis* (Mal.)
 Lifschitz, M., with Herrmann, 650 (Mal.)
 Lillie, R. D., 723 (C.Bu.)
 Lim, C. E., 944 (Lab.)
 Lima, A. da C., 308, (937) (Z.)
 —, with Aragão, 483, 870 *bis* (Y.F.)
 Limkako, G., with Velasco, Alonso, Fernandez & Del Rosario, 334 (Lep.)
 Lincoln, M. C. & Gardner, S. M., 535 (Myc.)
 Lindberg, K., 675 (Lep.)
 Ling, S. M., 618 (K.A.)
 Linton, R. W., 281 (Z.), 853 (S.S.),
 Lipscomb, F. M., 156 (Misc.)
 Lisbonne, M. & Balmès, 543 (Und.)
 Lister, F. S., 367 (Lab.)
 Lister, S., 166 (Misc.)
 Little, C. J. H., 62 (Misc.)
 — & Bornshin, W., 799 (Dys.)
 Liu, H. L., (220) (Mal.)
 Liu, K. B., (474) (Hel.)
 Liu, P., with Young & Hertig, 94 (K.A.)
 Livon, J. & Placidi, L., 748 (Rab.)
 Lloyd, L., 846 (S.S.)
 —, with Johnson, 811 (S.S.)
 — & Paisley, J. C., 844 (S.S.)
 Lloyd, R. B., Napier, L. E. & Mitra, G. C., 619 (K.A.)

Lloyd, R. B. & Paul, S. N., 561 (Misc.)
 Lloyd, W., with Sawyer, Kitchen & Frobisher,
 Jr., 487 (Y.F.)
 Locatelli, P., 243 (S.S.)
 Lodder, J., with Bonne, 529 (Der.)
 Löffler, E. & Schweinburg, F., 751 (Rab.)
 Lohfeldt, with Ruge, Knabe, Eisenberg &
 Kunert, 214 (Mal.)
 Lolli, G., 472 (Hel.)
 Longo, D., 151 (Fev.)
 van Loon, F. H. G., 345 *bis* (Sp.)
 Lopes, R. S., 450 (Hel.)
 López, J. A., (937) (Z.)
 Lopez-Neyra, C. R. & Torres Lopez, A. J.,
 445 (Hel.)
 Lo Presti-Seminario, F., 98 (K.A.)
 Lörincz, F., 444 (Hel.)
 Loughnan, W. F. M., 312, 928 (Z.)
 Lovell, R., 49 (Misc.)
 Low, G. C., 67, 583 (Misc.), 611 (K.A.)
 — & Dixon, D. S., 1024 (Sp.)
 Lowman, K. E., 50 (Misc.)
 Lubieniecki, H., 983 (Hel.)
 de Luca, B., 209 (Mal.)
 Luigi, F., 170 (Misc.)
 Lujan, M. & Nauck, E., 527 (Der.)
 Lumbroso, U., 1011 (Oph.)
 Luque, F., with Castellano & Orgaz, 967 (Hel.)
 Lusena, M., 541 (Und.)
 Luz, A. C., 683 (Lep.)
 Lwoff, M., 286 (Z.), 841 (S.S.)
 Lynch, F. B. & Callan, A. M., 546 (Und.)

M

Maass, E., 524 (Der.)
 M'Aleer, T. B., 716 (Y. & S.)
 McAlpine, J. G., Plastringe, W. N. & Brigham,
 G. D., 550 (Und.)
 MacArthur, W. P., 527 (Der.)
 —, Dudley, S. F. & Whittingham, H. F.,
 148, (556) (Fev.)
 McCarrison, R., 758 (Bb.)
 MacClure, E., with Kuczynski & Hohenadel,
 481 *bis*, 482 (Y.F.)
 McCoy, O. R., 426 *bis*, 466 (Hel.)
 Macdonald, G., with Gordon, 643 (Mal.)
 Macdonald, I., (405) (Dys.)
 Macfie, J. W. S. & Thomson, J. G., 282 (Z.)
 Macgregor, M. E., 297 (Z.)
 — & Lee, C. U., 299 (Z.)
 McGuire, C., 515 (Der.)
 —, with Acton, 523 (Der.)
 McGuire, G., 41 (Misc.)
 Machattie, C., with Mills & Chadwick, 620
 (K.A.)
 McHenry, D. D., 502 (Oph.)
 Macht, D. I., 341 (Lep.)
 Maciel, H., 449, 455 *bis* (Hel.), 525 (Der.)
 McKay, A. C., with Ross, 451 (Hel.)
 McKendrick, A. G., 1033 (B.R.)
 Mackie, F. P. & Chitre, G. D., 349 (Sp.)
 —, Fairley, N. H. & Staff of the Haffkine
 Institute, 343 (Sp.)
 McKinley, E. B., 310 (Z.)
 Mackinnon, M., 35 (Misc.)
 Maclean, G., 227, 229, 809, 847 (S.S.)
 McNabb, J., 387 (Am.), 593 (Misc.)

MacPherson, J., 357 (Z.)
 Maczkiewicz, A., 444 (Hel.)
 Madras, 29, 1015 (Oph.), 369 (Lab.)
 Maeda, M., 453 (Hel.)
 Magath, T. B. & Brown, P. W., 802 (Dys.)
 Magovcević-Schneider, D., with Dimitrijević-
 Speth, (405) (Dys.)
 Mahaffy, A. F., with Bauer, 871, 875 (Y.F.)
 Maitra, G. C., with Tomb, 14 (Chl.)
 Maitra, J. N., 402 (Dys.)
 Majumdar, A. R., 96 (K.A.), 788 (Am.)
 Makarjin, A. A., 646 (Mal.)
 Malandkar, M. A., with Sokhey, 343 (Sp.)
 Malha, G. R., 278 (Z.)
 v. Mallinckrodt-Haupt, A., 922 (Z.)
 Malone, R. H., 750 (Rab.)
 —, with Cunningham, 742 (Rab.)
 —, with d'Herelle & Labiry, 558 *bis* (Misc.),
 1026 (B.R.)
 Maltzer, M., 691 (R.F.)
 Manai, A., 574, 576 (Misc.)
 Manalang, C., 172 (Misc.), 304 (Z.), 640 (Mal.)
 Maneri, A. & Gori, P., (117) (R.F.)
 Mankikar, D. S., with Pandit, George &
 Natarajan, 917 (Z.)
 Manouelian, Y., 700 (R.F.)
 Mansell, H. E., 792 (Dys.)
 Mansell, R. A., 217, 218 (Mal.), 927 (Z.)
 Mansfield-Aders, W., 943 (Lab.)
 Manson-Bahr, P. H., 67 (Misc.), 346 *bis* (Sp.),
 457, 463 (Hel.)
 —, Maybury, J. M. & Martin, P. H., 343
 (Sp.)
 — & Tart, C. B. V., 378 (Am.)
 — & Willoughby, H., 1017 (Sp.)
 Manteufel, P. & Herzberg, K., 877 (Y.F.)
 Manuclidas, 142 (Fev.)
 Manuwa, S. I. A., 47 (Misc.)
 Maplestone, P. A., 410, 984 (Hel.)
 — & Mukerji, A. K., 419 (Hel.)
 Marchoux, E., 194 (Mal.)
 — & Chorine, V., 701 (R.F.)
 Marguesu, P., 662 (Mal.)
 Margulis, S., 968 (Hel.)
 Marie, A. C., 754 (Rab.)
 — & Urban, A., 255, 745 (Rab.)
 Markianos, J., 340 *ter*, 341, 686 *quat.*, 687
 (Lep.)
 —, with Valtis, 686 (Lep.)
 Markowitz, J., with Essex, 932 *bis* (Z.)
 Marrioton, J. E., with Worms, 23 (Oph.)
 Marnoffe, H., with Labernadie, 441 (Hel.)
 Marque, A. M., 752 (Rab.)
 Marras, F. M., 9 (Pl.)
 Marsh, F., (406) (Dys.)
 Marshall, J. F. & Staley, J., 300, 301 (Z.)
 Martin, C. de C., 798 (Dys.)
 —, with Morison, 558 (Misc.)
 Martin, K. A. T., 158 (Misc.)
 Martin, P. H., 343 (Sp.), 503 (Oph.)
 —, with Manson-Bahr & Maybury, 343 (Sp.)
 —, with Newham, 60 (Misc.)
 Martin, S. H., 346 (Sp.)
 Martini, E., 865 (Y.F.)
 Martins, A., 317 (Z.)
 Marwits, E. L. & van Steenis, P. B., 386 (Am.)
 Marzinowsky, E. I. & Schourenkova, A.,
 912 (Z.)
 Masing, E., 289 (Z.)

- Maslow, A. W., 904 (Z.)
 Mason, V. R., with Kessel, 800 (Dys.)
 Massaitis, I. I., 646 (Mal.)
 Massia, G., with Nicolas, 623 (K.A.)
 Massias, C., 1008 (Lep.)
 Matheson, C., 960 (Hel.)
 Matheson, R., 511 (B.R.)
 — & Hinman, E. H., 298, 901 (Z.)
 Mathias, P., 960 (Hel.)
 Mathis, C. & Baur, A., 529 (Der.)
 Mathis, M. S., with Wilson, 708 (Y. & S.)
 Matsuno, K., 181 (Mal.)
 Matsuo, K., with Shiba, 799 (Dys.)
 Matsushima, R., Taguchi, S., Suenaga, D. & Ohya, O., 206 (Mal.)
 da Matta, A. A., 341, (342) (Lep.), 710 (Y. & S.)
 Mattlet, with Guerin, 158 (Misc.)
 Mattlet, G., 169 (Misc.), 715 (Y. & S.)
 Matzinger, W., (993) (Hel.)
 Maugeri, F., with Fichera, 550 (Und.)
 Mauritius, 369, 944 (Lab.)
 Maxwell, J. L., 670 (Lep.)
 Maxwell, T. A., 515 (Der.)
 —, with Faust, 920 (Z.)
 Maybury, L. M., with Manson-Bahr & Martin, 343 (Sp.)
 Mayer, M., 618 (K.A.)
 Mayer, T. F. G., 671, 996 (Lep.)
 Mayerson, H. S., with Scott & Turner, 777 (Pel.)
 Mayne, B., 182, 658 (Mal.), 273, 899 (Z.)
 Mazza, S., 839, 840 (S.S.)
 — & Bianchi, A. E., 466 (Hel.)
 — & Niño, F., 103 (K.A.)
 — & Parodi, S., 533 (Myc.)
 Medeiros, L., 328 (Lep.)
 Medulla, C., (148), 151, (554) (Fev.), 329 (Lep.), 456 (Hel.), 783 (Am.)
 Megaw, J. W. D., 757 (Bb.)
 — & Hawley, H., 572 (Misc.)
 —, with Rogers, 688 (B.R.)
 de Meillon, B., 306 (Z.)
 Meladse, K., 443 (Hel.)
 Meleney, H. E., 71 (Misc.), 779 (Am.)
 Melhorn, K. C., 589 (Misc.)
 de Mello, E. J., 867 (Y.F.)
 de Mello, F., 209 (Mal.)
 —, Brás de Sá, L. J. & d'Arbeu, M., 657 (Mal.)
 — & Fialho, (117) (R.F.)
 — & Rodrigues, A., 518 *bis* (Der.)
 de Mello, I. F., 116 (R.F.), 185 (Mal.)
 — & da Cruz, L. J. C. (406) (Dys.)
 Melnotte, P., with de Lavergne & Debenedetti, 794, 795 (Dys.)
 Mendes, N. O., with de Assis, 397 (Dys.)
 Mendioroz, J., 672 (Lep.)
 de Mendonça, F. C., with Pacheco, 800 (Dys.)
 Menendez, P. E., with Bachman, 981 (Hel.)
 Menk, W., 590 (Misc.), 787 (Am.)
 Mennonna, G., 456 (Hel.)
 Mense, C., 949 (B.R.)
 Mesik, P. E., 104 (K.A.)
 Mesnard, J., Joyeux, B. & Gaulene, 566 (Misc.)
 Mesnil, F., 807 (S.S.)
 Messik, R. E., 97 (K.A.)
 Messimy, R., 1009 (Lep.)
 Metcalfe, A. N., with Barnes & Lentz, 754 (Rab.)
 Metzler, 323 (Z.)
 Meyer, G. J., Oferlé & Uhry, P., 775 (Pel.)
 Meyer, K. F. & Eddie, B., 545, 546 (Und.)
 Meyerhof, M., 24 (Oph.)
 Michael, J. C. & Seale, E. R., 527 (Der.)
 Micheletti, E., 200 (Mal.), 428 (Hel.)
 Middleton, A. D., 124 (Lept.)
 Mieldazis, J. J., 908 (Z.)
 Miguens, J., 715 (Y. & S.)
 Millet, A. H., 23 (Oph.)
 Millous, P., 553 (Fev.)
 Mills, E. A. & Machattie, C., with Chadwick, C. R., 620 (K.A.)
 Minamizaki, Y., 408 (Hel.)
 Minot, A. S. & Cutler, J. T., 569 (Misc.)
 Mirra, G., 409 (Hel.)
 Missiroli, A., 219 (Mal.), 289, 892 (Z.)
 Mitana, K., 123 (Lept.)
 Mitchell, J. A., 669 (Lep.), 740 (Pl.)
 Mitra, A. C., 66 (Misc.)
 Mitra, G. C., with Lloyd & Napier, 619 (K.A.)
 Mitsuse, B., 624 (K.A.)
 Miyake, M., 856 (Chl.)
 Miyamoto, S., 903 (Z.)
 Miyao, I., 714, 717 *bis*, 719 (Y. & S.)
 —, with Schöbl, 717 (Y. & S.)
 —, with — & Pineda, 682 (Lep.)
 Miyasaki, S., (474) (Hel.)
 Mochtar, A., 467 (Hel.)
 Mohanty, L. N., (342) (Lep.)
 Molinelli, E. A. & Royer, M., 340 *bis* (Lep.)
 — & Vaccarezza, A. J., 341, 685, 1002 (Lep.)
 Mollow, W., (474), 971 (Hel.)
 Molodtsova, P. F., with Ignatiev, 320 (Z.)
 Monbrun, A., 503 (Oph.)
 Monnerot-Dumaine, M., with Troisier & Leon-Kindberg, 119 (Lept.)
 Monteiro, J. L., 485, 493, 866, 877, (879) (Y.F.)
 — & Travassos, J., 878 *bis* (Y.F.)
 Monteiro, I., 496 (Y.F.)
 Montel, M. I. R., 83 (Misc.)
 Monteleone, R., 206 (Mal.)
 Montpellier, J., 521 (Der.)
 de Moor, C. E., 431 (B.R.)
 — & Vedder, A., 694 (R.F.)
 Morales-Otero, P. & Hernandez, L. G., 1008 (Lep.)
 Morax, V., 22, 23, 1012 (Oph.)
 Morenas, 990 (Hel.)
 Morenas, L., 889 (Z.), 970, 990 (Hel.)
 —, with Cordier, 786 (Am.)
 Moretti, G., 974 (Hel.)
 Moretti, P., 113 (R.F.)
 Morgan, W. B., 154 (Misc.)
 Morin, H. G. S., 307 (Z.), 564 (Misc.), 641 (Mal.)
 Morishita, K., 185 (Mal.)
 Morison, J., 371 (Lab.)
 —, Choudhury, B. K. P. & Rahman, H., 855 (Chl.)
 — & Martin, C. de C., 558 (Misc.)
 — & Vardon, A. C., 560 (Misc.)
 Moriaki, G., 794 (Dys.)
 Moroder, J., 113 (R.F.)
 Moroder Muedra, J., 701 (R.F.)

Morrell, C. A., with Wakeman, 876 (Y.F.)
 Moschkowski, S., 218 (Mal.)
 Moskwini, I. A., 109 (R.F.)
 Motais, F., 964 (Hel.), 1015 (Oph.)
 Motta, J., 1001 (Lep.)
 Mounier, with Garin & Doubrow, 414, 428 (Hel.)
 Mouquet, A., 723 (Y. & S.)
 Mtschedlidse, I., 415 (Hel.)
 Mu, J., with Hu, 1007 (Lep.)
 — & Huie, D., 97 (K.A.)
 Mudschiri, M., 415 (Hel.)
 Mugrage, E. R., 745 (Rab.)
 Mthlens, P., 404 *bis* (Dys.), 622 (K.A.), 658 (Mal.)
 —, with Ruge & zur Verth, 175 (B.R.)
 Muir, E., 326, 332, 338, 1000, 1007 (Lep.), 1025 (B.R.)
 Mukerjee, S. K., 26, 28 (Oph.)
 Mukerji, A. K., with Maplestone, 419 (Hel.)
 Mukerji, S., (937) (Z.)
 Mukharji, B. C., 710 (Y. & S.)
 Mukherjee, B. P., with Chopra, 616 (K.A.)
 Muldoon, W. E., 1010 (Oph.)
 Muller, H. R., with Noguchi, Tilden & Tyler, 153 *bis* (Fev.)
 — & Tilden, E. B., 478 (Y.F.)
 — & Tyler, J. R., 557 (Fev.)
 Mullick, M. N., with Napier, 93 (K.A.)
 Munce, T. E., 754 (Rab.)
 Muniz, J., with da Cunha, 272, 290 *bis* (Z.), 492 (Y.F.)
 Munro, R., (803) (Dys.)
 Muraz, G., 814 (S.S.)
 Murgatroyd, F., with Yorke & Adams, 237, 804 (S.S.)
 Murphy, J. F., with Smith, 753 (Rab.)
 Murphy, R. A., 197 (Mal.)
 Murray, G. E., 660 (Mal.)
 Myers, J. G., 321 (Z.)
 Mynssen, G. E. H. V., 786 (Am.)

N

Naidu, B. P. B. & Avari, C. R., 728 (Pl.)
 —, with Caius, 734 (Pl.)
 — & Jung, J. S., 6, 728 (Pl.)
 —, — & Kamakaka, K. H., 740 (Pl.)
 Naique, R., 61 (Misc.)
 Najera, L., with Zschucke, 437 (Hel.), (854) (S.S.)
 Nakamura, H. & Shan, C. P., (406) (Dys.)
 Nambiar, M. R., with Gloster, Beer & Sastry, 259 (Rab.)
 Namikawa, H., 695 (R.F.)
 Nanhorya, H. B. D., 25 (Oph.)
 Nanta, A., 71 (Misc.)
 Napier, E., 91 (K.A.)
 Napier, L. E., 615 (K.A.)
 — & Gupta, C. R. D., 607 (K.A.)
 — & Haldar, K. C., 92 (K.A.)
 —, with Lloyd & Mitra, 619 (K.A.)
 — & Mullick, M. N., 93 (K.A.)
 — & Sen, G. N., 615 (K.A.)
 Nasaretian, L., 773 (Pel.)
 Natarajan, N., with King, Iyer & George, 319 (Z.)
 —, with Pandit, George & Mankikar, 917 (Z.)

Nativelle, R., 675 (Lep.)
 Nauck, E., with Lujan, 527 (Der.)
 Nauck, E. G., 412 (Hel.)
 —, with Chavarria, 161 (Misc.)
 — & Picado, C., 659 (Mal.), (993) (Hel.)
 Naumann, H. E., 787 (Am.)
 Nauth, B., 510 (B.R.)
 Navarro, A., (220) (Mal.)
 Nayari, K. K., with Wright, 27 (Oph.)
 Nazmi, M., with Augustine & Helmy, 409 (Hel.)
 Neff, E. A., 678 (Lep.)
 Neil, J. M., with Ayer, (937) (Z.)
 Nepveux, F., with Labbé & Justin-Besançon, 278 (Z.)
 Neri, F., (148) (Fev.)
 Netherlands Indies Medical & Sanitary Service, 434 (B.R.)
 Neveu-Lemaire, E., (474) (Hel.)
 Newcomb, C., 765 (Bb.)
 — & Verdon, P., 26 (Oph.)
 Newham, H. B. & Martin, P. H., 60 (Misc.)
 Newman, B. M., with Barber & Komp, 188 (Mal.)
 Newsad, A., 914 (Z.)
 Nguyen-van-Khai, 756 *bis* (Bb.)
 Nicholas, M. J., with Cunningham & Lahiri, 746 (Rab.)
 Nicholls, L., 360 (Z.)
 Nicol, W. D., with James & Shute, 181, 183 (Mal.)
 Nicolaew, B. P. & Yakowlewa, W. W., 892 (Z.)
 Nicolas, Lacassagne & Froment, R., 775 (Pel.)
 Nicolas, C., with Lara, 334 (Lep.)
 Nicolas, J. & Massia, G., 623 (K.A.)
 Nicolau, S. & Kopciowska, L., 251 (Rab.)
 Nicolle, C., 556 (Fev.), 1012 (Oph.)
 — & Anderson, 106, 108, 109, 692, 693 (R.F.)
 —, — & Colas-Belcour, J., 107, 692 *bis* (R.F.)
 —, — & Hornus, P., 106 (R.F.)
 —, Durand, P. & Conseil, E., 735 (Pl.)
 Nicolle, P., with Launoy & Prieur, 231, 834 (S.S.)
 Niekerk, J., with Andu, 17 (Chl.)
 van Niekerk, J., with Soeleiman, 859 (Chl.)
 Nieschulz, O., 899, 903 (Z.)
 — & Wawo-Roentoe, F. K., 577 (Misc.), 707 (Lept.), 848 (S.S.), 891, 924 (Z.)
 Nigam, K. S., 74 (Misc.)
 Nigeria, 730 (Pl.), 939, 940 *ter* (Lab.), 996 (Lep.)
 Niño, F., with Mazza, 103 (K.A.)
 Nitsche, O., 286 (Z.)
 van Nitsen, R., & Langeron, J., (406) (Dys.)
 Nitzulescu, V., 313 *bis* (Z.)
 Noda, M., 549 (Und.)
 Noguchi, H., Muller, H. R., Tilden, E. B. & Tyler, J. R., 153 *bis* (Fev.)
 Nohira, A., 114 *bis* (R.F.)
 Nolasco, J. O., 1003 (Lep.)
 Nolf, L. O., with Ackert, 469 (Hel.)
 No-Lorandos & Pangalos, G., 383 (Am.)
 Norgaard, A., with Thaysen, 351 (Sp.)
 Nubert, G. & Branisteau, D., 790 (Am.)
 Nunez, P. E., 1023 (Sp.)
 Nuttall, G. H. F., with Keilin, 921 (Z.)
 Nutter, R. B., 101 (K.A.)

O

- Ōba, T., (474) (Hel.)
 Obana, K., with Kondo, 749 (Rab.)
 O'Brien, A. J. R., 716 (Y. & S.)
 O'Brien, C. S., 504 (Oph.)
 O'Brien, H. R., 978 (Hel.)
 Ochoterena, I., 992 (Hel.)
 O'Connor, F. W., 986 (Hel.)
 —, Golden, R. & Auchincloss, H., 986 (Hel.)
 Oekonomopoulou, N., 145 (Fev.)
 von Oettingen, W. F., 957 (Hel.)
 — & Garcia, F., 957 (Hel.)
 Oferlé, with Meyer & Uhry, 775 (Pel.)
 Office International d'Hygiène Publique,
 42, 43 (Misc.)
 Ogawa, J., 393 (Am.)
 Ohya, O., with Matsushima, Taguchi &
 Suenaga, 206 (Mal.)
 Oiso, T., 428 (Hel.)
 Okell, C. C., 877 (Y.F.)
 — & Blake, A. V., 399 (Dys.)
 Oleinikow, S. V., 983 (Hel.)
 de Oliveira, W., 499 (Y.F.)
 Olmer, D. & Olmer, J., 150 (Fev.)
 Olmer, J., with Gaston & Amédéo, 393 (Am.)
 Olpp, 674 (Lep.)
 Ophüls, W., 979 (Hel.)
 Oquifena Echalecu, F., 965 *bis* (Hel.)
 Orellana, 755 (Rab.)
 Orenstein, A. J., 651 (Mal.)
 —, with Fischer, 408 (Hel.)
 Orgaz, J., with Castellano & Luque, 967 (Hel.)
 Oriishi, N., (406) (Dys.)
 Ormond, A. W., 1015 (Oph.)
 Ortiz de Landazuri, A., 956 (Hel.)
 Oselladore, G., with Fasiani, 534 (Myc.)
 Osterberg, A. E., with Goeckerman &
 Sheard, 529 (Der.)
 Ostrowski, B., 612 (K.A.)
 Otaka, Y., 8 (Pl.)
 Otero, P. M., 541 (Und.)
 Otto, G. F., 974 (Hel.)
 —, with Cort & Spindler, 973 (Hel.)
 Otto, R., 360, 933 (Z.)
 Ottolenghi, D. & Brotzu, G., 649 (Mal.)
 Ouchakov, V. G., 261 (Rab.)
 Ozawa, M., 963 (Hel.)

P

- Pacheco, G., (406), 796 (Dys.)
 — & Fialho, A., 404 (Dys.)
 — & de Mendonça, F. C., 800 (Dys.)
 — & Rodrigues, C., 797 (Dys.)
 Paine, R. W. & Edwards, F. W., 301 (Z.)
 Paisley, J. C., with Connal, Elmes & Bowrey,
 9 (Pl.)
 —, with Lloyd, 844 (S.S.)
 Paldrock, A., 329 (Lep.)
 Palevici-Sadogurskaja, M., (406) (Dys.)
 Palthé, P. M. v. W., 752 (Rab.)
 Pampana, E., 696 (R.F.)
 Pampana, E. J., 526 (Der.)
 Panayotatou, A., 381 (Am.), 614 (K.A.)
 Pandit, C. G., George, P. V., Mankikar, D. S.
 & Natarajan, N., 917 (Z.)
 —, Pandit, S. R. & Iyer, P. V. S., 989 (Hel.)

- Pandit, S. R., with Pandit, C. G. & Iyer, 989
 (Hel.)
 Pangalos, G. C., 99 (K.A.)
 —, with Blanc & Joannides, 1005 (Lep.)
 —, with No-Lorandos, 383 (Am.)
 Panja, G., 516 (Der.)
 Papadopoulos, J., with Petzetakis, 68 (Misc.)
 Pappalardo, C., 383 (Am.)
 Parodi, S., with Mazza, 533 (Myc.)
 Parreiras, D., 495 (Y.F.)
 Parrot, L., 103 (K.A.)
 —, with Foley, 323 (Z.)
 —, with Sergeant, Edm., Donatien &
 Lestoquard, 289 (Z.)
 —, with — & Sergeant, Et., 299 (Z.)
 —, with Sergeant, Et., 312, 323 (Z.)
 Parsons, A. L., 218 (Mal.)
 Pashitnowa, Z. A., 907 (Z.)
 Pastor Botija, F., with Hernandez-Pacheco,
 444 (Hel.)
 Patel, P. T., 729 (Pl.)
 Patton, W. S. & Evans, A. M., 177 (B.R.)
 Paul, F., 958 (Hel.)
 Paul, S. N., with Lloyd, 561 (Misc.)
 Paulson, M. & Andrews, J., 885 (Z.)
 Pavlova, P., with Schourenkova & Demina,
 913 (Z.)
 Pavlovsky, E. N. & others, 951 (B.R.)
 Pawlowsky, E. N. & Chodukin, N. J., 323 (Z.)
 — & Stein, A. K., 322, 361 (Z.)
 Pecori, G. & Escalar, G., 195 (Mal.)
 Peiping Union Medical College, 265 (B.R.)
 Peirier, 336, 1003 (Lep.)
 Peller, S., 645 (Mal.)
 Peltier, M., 456 (Hel.)
 — & Raynal, J., 459 (Hel.)
 Peña Chavarria, A., with Barrera, 334 (Lep.)
 — & Shipley, P. G., 518 (Der.)
 Penna, O. & de Figueiredo, B., 477, 868 (Y.F.)
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 Perckropoff, G. J., 891 (Z.)
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 Perfiliev, P. P., 313 (Z.)
 Pergher, G., with Sanarelli, 120, 121 (Lept.)
 Perry, H. M., 463 (Hel.)
 Peryassú, A. G., 312, (938) (Z.)
 Pessôa, S. B., 408, 448 *bis* (Hel.)
 Peter, L. C., 25 (Oph.)
 Peterson, J. P. & Ginsburg, J. M., 926 (Z.)
 Petrov, V. P., 554 (Fev.)
 Pettit, A., Roubaud, E. & Stéfanopoulos, G.,
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 — & Stéfanopoulos, G., 488, 489, 875 (Y.F.)
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 — & Papadopoulos, J., 68 (Misc.)
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 Photinos, P., 514 (Der.)
 Picado, C., with Nauck, 659 (Mal.), (983)
 (Hel.)
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 — & King, G., 25 (Oph.)
 Pilon, P. J. J. R. T., 22 (Oph.)
 Pinard, M., Rabut, Girand & Abricosoff, 341 (Lep.)
 Pineda, E. V., Pineda, E. R. & Dayrit, A., 679 (Lep.)
 —, with Schöbl & Miyao, 682 (Lep.)
 —, with Wade, 326 (Lep.)
 Pinto, G. de S., 524 (Der.)
 Pirani, A., 251 (Rab.)
 Pirie, J. H. H., 465 (Hel.), 738 (Pl.)
 —, Retief, F. & Ferguson, A. L., 427 (Hel.)
 Pirot, 269 (Z.), 411 (Hel.)
 — & Barrat, 982 (Hel.)
 Piva, G., 542 (Und.)
 Piza, J. de T. & Gomes, L. de S., 703 (Lept.)
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 Placidi, L., with Livon, 748 (Rab.)
 Plantureux, E., 262 *bis*, 263 (Rab.)
 Plastringe, W. N., with McAlpine & Brigham, 550 (Und.)
 Plaut, A. & Vogel, H., 458 (Hel.)
 Plotnikov, N. N. & Sertschaninov, L. K., 442 (Hel.)
 Pocock, R. I., 49 (Misc.)
 Poggi, I., 553 (Fev.), (938) (Z.)
 Pollitzer, R., with Wu Lien-Teh, Chia-Swee & Jettmar, 2 (Pl.)
 Ponomarev, A. V., with Gantt, 749 (Rab.)
 Ponomarew, A. W., with Gantt, 255 (Rab.)
 Pons, R., 391 (Am.), (406) (Dys.)
 Porter, A. & Heymann, S. C., (938) (Z.)
 Porter, W. B. & Rucker, J. E., 1020 (Sp.)
 Porto, G., 318 (Z.)
 Porto Rico, 216 (Mal.)
 Poston, M. A., with Amoss, 135 (Und.)
 Potapenko, N. A., 215 (Mal.)
 Pottinger, D., 656 (Mal.)
 —, with Sinton & Smith, 656 (Mal.)
 Poursines, with Boinet & Turriès, 382 (Am.)
 Prados y Such, M., 772 (Pel.)
 Praetorius, G., 465 (Hel.)
 Prates, M. M., 91 (K.A.)
 Pratt, T. A. & Frew, H. W. O., 792 (Dys.)
 Predtetschenskaja, L. A., with Glusmann & Ssolowjewa, 747 (Rab.)
 Price, E. W., 457 (Hel.)
 Prieur, M., with Launoy, 833 *bis* (S.S.)
 —, with — & Nicolle, 231 (S.S.)
 —, with — & —, 834 (S.S.)
 Proceedings of the Royal Society of Medicine, 49, 67 (Misc.), 538 (Und.)
 Proceedings of the Third Scientific Medical Congress of Middle Asia, 1028 (B.R.)
 Public Health Reports, 138 (Fev.), 866 (Y.F.)
 Puestow, K. L., 522 (Der.)
 Puff, G., 716 (Y. & S.)
 Pugh, L. P., 538 (Und.)
 Puri, I. M., 308 *bis*, (938) (Z.)
 Py, C. & Riveros, M., 1004 (Lep.)

Q

Quaife, W. T., 909 (Z.)
 von Querner, F. R., 451 (Hel.)

R

de Raadt, O. L. E., 681 (Lep.)
 Rabut, with Pinard, Girand & Abricosoff, 341 (Lep.)
 Radocovici, E., with Zotta, 242 *bis* (S.S.)
 Raevsky, A. S., 147 (Fev.)
 Ragain, 1011 (Oph.)
 Ragazzi, C. A., 735 (Pl.)
 Rahman, H., with Morison & Choudhury, 855 (Chl.)
 Rajamoney, P. D., with Gater, 303, 305 (Z.)
 Rajcevic, M., 959 (Hel.)
 Rambo, V. C., 158 (Misc.)
 Ramsay, G. C., 637 *bis* (Mal.)
 Ramsay, G. W. St. C., 940 *bis* Lab.), 996 (Lep.)
 Ramsine, S., 556 (Fev.)
 Ranadive, V. Y., with Kamat, 326 (Lep.)
 Ranieri, G., 973 (Hel.)
 Rao, G. R., 318 (Z.)
 Rao, H. S., 268 (Z.)
 Rao, S. S., with Acton, 988 *bis*, 990 (Hel.)
 Ratcliffe, H. L., 273, 885, 887, 890 *bis* (Z.)
 Ratnagiriswaran, A. N., with Chopra & Ghosh, 65 (Misc.)
 Rattan, B., 172 (Misc.)
 Ray, J. C., 620 (K.A.)
 Ray, K. S., 510 (B.R.)
 Raybaud, A., with Roger, 542 (Und.)
 de Raymond, 516 (Der.)
 Raynal, J., 459, 463, (474) (Hel.)
 —, with Peltier, 459 (Hel.)
 Razafindralambo, with Fontynont, 799 (Dys.)
 v. Razgha, A., 244 (S.S.)
 Reasoner, M. A., 720 (Y. & S.)
 Recordier, with Roussac, 151 (Fev.)
 Reed, A. C., 1030 (B.R.)
 Regendanz, P., 281 *bis* (Z.), 839, 850 (S.S.)
 — & Hoeppli, R., 225 (S.S.)
 —, with —, 850 (S.S.)
 — & Jurukoff, B., 844 (S.S.)
 —, with Kikuth, 579 (Misc.)
 Regis, L. J., 500, (879) (Y.F.)
 Reichenow, E., 645 (Mal.)
 Reiss, F., 533 (Myc.)
 Reitler, R., 646 (Mal.)
 Remlinger, P., 744, 745 (Rab.)
 — & Bailly, J., 107 *bis*, 108, 696, 697, 700, 701 (R.F.), 251, 252 *bis*, 256, 262, 753 *quat.*, 755 *bis* (Rab.)
 —, Catanié & Bailly, 699 (R.F.)
 Remontet, J. E., with Vialatte, 573 (Misc.)
 Renaud, M., 934 (Z.)
 Resolutions passed at the All-India Medical Conference, 510 (B.R.)
 Retief, F., with Pirie & Ferguson, 427 (Hel.)
 Revista de la Conferencia Sanitaria Nacional. Caracas, (474) (Hel.)
 Revue Pratique des Maladies des Pays Chauds, 385 (Am.)
 Reynolds, D., 100 (K.A.), 653 (Mal.)
 Reynolds, F. H. K., with St. John & Simmons, 552 *bis* (Fev.)
 —, with — & —, 552 *bis* (Fev.)
 Rhodesia, Southern, 916 (Z.)
 Richet, C. & Gley, P., 232 (S.S.)
 Rico, J. T., 413, 451 (Hel.)
 Riegl, R., with Tsykalas, 459 (Hel.)
 van Riemsdijk, M., 18 (Chl.)

- Riley, W. A., 269 (Z.)
 — & Christenson, R. O., 689 (B.R.)
 —, with Cort, Schapiro & Stoll, 440 (Hel.)
 —, with —, Stoll, Sweet & Schapiro, 431 (B.R.)
 Riou, with Delpy & Cauvin, 744 (Rab.)
 Risquez, F. A., 51 (Misc.)
 de Rivas, D., 160 (Misc.)
 Rivera, T., with Hoffman, 452 (Hel.)
 Riveros, M., with Py, 1004 (Lep.)
 Rivnay, E., 921 (Z.)
 Robbins, B. H., 450, 981 (Hel.)
 —, with Lamson & Ward, 418 (Hel.)
 Roberts, S. R., 768 (Pel.)
 Robertson, M., 279 (Z.)
 Robertson, O. H. & Cheer, S. N., 863 (B.R.)
 Robertson, R. L., 438 (Hel.)
 Rodenwaldt, E. R. K. & Cohen, A. J., 550 (Und.)
 Rodrigues, A., with de Mello, 518 *bis* (Der.)
 Rodrigues, C. & Pacheco, 797 (Dys.)
 Rodriguez, J., 675 (Lep.)
 Rodriguez Lopez-Neyra, C. & Torres Lopez, A. J., 965 (Hel.)
 Roegholt, M. N., 155 (Misc.)
 Roehl, W., 93 (K.A.)
 Roger, H., 542 *ter* (Und.)
 — & Albert-Cremieux, 542 (Und.)
 — & Raybaud, A., 542 (Und.)
 Roger-Nataf, with Cuénod, 27 (Oph.)
 Rogers, L., 331, 669 *bis* (Lep.)
 — & Megaw, J. W. D., 688 (B.R.)
 Rojas, M., 187 (Mal.)
 Romanowa, K. G., with Levinson, 837 (S.S.)
 Romanowa, K., with Roskin, 233, 837 (S.S.)
 Rome, 173 (B.R.)
 Romiti, C., 566 (Misc.)
 de Rook, H., 985 (Hel.)
 Rose, W. J., 129 (R.B.F.), 381 (Am.)
 Rosenberg, M., 203 (Mal.)
 Rosenfeld, W. D., with Dubrowski, Kranzfeld & Salamandra, 415, 442 (Hel.)
 Rosenthal, F., 238, 240 (S.S.)
 Roskin, G., Bichowskaja, A. & Schischliaicwa, S., 837 (S.S.)
 — & Levinson, L. B., 694 (R.F.)
 — & Romanowa, K., 233, 837 (S.S.)
 Ross, I. C., 958, 959 (Hel.)
 — & McKay, A. C., 451 (Hel.)
 Ross, P., 438 (Hel.)
 Ross, R., 634 (Mal.)
 Rossow, A. W., 721 (Y. & S.)
 Rothermundt, M., 111 (R.F.)
 Roubaud, E., 497 (Y.F.), 911 (Z.)
 — & Colas-Belcours, J., 310 (Z.)
 —, with Pettit & Stéfanopoulos, 874 (Y.F.)
 Rouslacroix & Recordier, 151 (Fev.)
 Rousseau, 584 (Misc.)
 Rousseau, M., 505 (Oph.)
 Row, R., 326 (Lep.)
 Roy, A. C., with Boyd, 94 (K.A.), 570 (Misc.)
 Roy, B. C., 510 (B.R.)
 Roy, D. N., with Strickland, 731 (Pl.)
 Royer, M., with Molinelli, 340 *bis* (Lep.)
 Ruberti-Fiera, E., 167 (Misc.)
 Rubinstein, P. L., with Kritschewski, 577 (Misc.)
 —, with Tschirikower, 577 (Misc.)
 Rubi'schung, O., 454 (Hel.)
 Ruchadse, N., 306 (Z.), 647 (Mal.)
 Rucker, J. E., with Porter, 1020 (Sp.)
 Ruge, H., 62 (Misc.), 724 (C.Bu.)
 —, Lohfeldt, Knabe, Eisenberg & Kunert, 214 (Mal.)
 —, Mühlens, P. & zur Verth, M., 175 (B.R.)
 Rukhadze & Blajin, 446 (Hel.)
 Russell, A. J. H., 12, 16 (Chl.)
 — & Sundararajan, E. R., 13, (21) (Chl.)
 Russell, H. M., 363 (Lab.)
 Russian Journal of Tropical Medicine, 138 (Fev.)
 Ruys, A. C., 128 (R.B.F.), 702 (Lept.)
 Rychener, R. O., with Ellett, 27 (Oph.)
 Ryoji, S., 959 (Hel.)
- 8
- de Sá, L. J. B., (600) (Misc.)
 Saad, B., 784 (Am.)
 Sabbagh, A. K., 623 (K.A.)
 —, with Traubaud & Khaiat, 394 (Dys.)
 Sacorrafos, (554) (Fev.)
 Saenz, A., 125 (Lept.)
 Saijo, Y. & Takino, M., 677 (Lep.)
 St. John, J. H., Simmons, J. S. & Reynolds, F. H. K., 552 *bis* (Fev.)
 —, with — & —, 552 *bis* (Fev.)
 Sakaraja, E., 417 (Hel.)
 Salah El Din, with Khalil, 963 (Hel.)
 Salamandra, E. G., with Dubrowski, Kranzfeld & Rosenfeld, 415, 442 (Hel.)
 Salisbury, E. I., 527 (Der.)
 Sall, M., with Durieux, 192 (Mal.)
 Salvati, 502 (Oph.)
 Salvioli, G., (406) (Dys.)
 Salzberger, M., 1025 (B.R.)
 Sanarelli, G. & Pergher, G., 120, 121 (Lept.)
 Sanchus-Bayarri, V., with Levaditi, Lépine & Schoen, 283, 285 (Z.)
 Sanders, E. P., with Cleveland, 887 (Z.)
 Sandground, J. H., 445, 468 (Hel.)
 Sanfilippo, E., with Ascoli, 136 (Und.)
 Sankin, S. L., 447 (Hel.)
 Sanner, 77 (Misc.)
 Santiago, V., 672 (Lep.)
 Santillan, P. & West, A. P., 335 (Lep.)
 de Santos, I. & —, 335 (Lep.)
 dos Santos, M., 263 (Rab.)
 São Paulo, 778 (B.R.)
 Sarchi, G., 5 (Pl.)
 Sarkar, H., with Sur, (600 *bis*) (Misc.)
 Sarkar, S. L., 183 (Mal.)
 Sarles, M. P., 422, 423 *bis*, 424, 425 (Hel.)
 Sartorius, F., 797 (Dys.)
 Sasaki, R., 765 *bis* (Bb.)
 Sastry, S. S., with Gloster, Beer, & Nambiar, 259 (Rab.)
 Sautet, J., 279 (Z.), 499 (Y.F.), 791 (Am.)
 Saverio, C., 962 (Hel.)
 Sawadsky, M., 911 (Z.)
 Sawyer, W. A. & Frobisher, M., Jr., 494 (Y.F.)
 —, Kitchen, S. F., Frobisher, M., Jr. & Lloyd, W., 487 (Y.F.)
 Schachmatow, A. P., 446 (Hel.)
 Schachsuarly, M., 274 (Z.)

- Schalimov, L. G., with Zawadowsky, 982 (Hel.)
 Schapiro, L., 411 (Hel.)
 —, with Cort, Riley & Stoll, 440 (Hel.)
 —, with — & Stoll, 421 (Hel.)
 —, with —, —, Sweet & Riley, 431 (B.R.)
 Schapiro, S. L., with Kritschewski, 578 (Misc.)
 Scharff, J. W., 180 (Mal.)
 Scheepers, I. K. M., 457 (Hel.)
 Scheff, G., 242 (S.S.)
 Scheidel, H., 277 (Z.)
 Scherer, E., 349 (Sp.)
 Schern, K., 853 (S.S.)
 Schewtschenko, F. I., 614 (K.A.)
 Schéwtschenko, P. I., 99 (K.A.)
 Schilling, C., 653 (Mal.)
 Schilling, V., 429 (B.R.), 473 (Hel.)
 Schischlaiewa, S., with Roskin & Bichow-skaja, 837 (S.S.)
 Schlossman, K., 684 (Lep.)
 Schmidt, G. W., with Doerr, 980 (Hel.)
 Schnauder, F., 748 (Rab.)
 Schnitzer, R. & Silberstein, W., 235 (S.S.)
 Schöbl, O., 717 *bis* (Y. & S.)
 — & Miyao, I., 717 (Y. & S.)
 —, Pineda, E. V. & Miyao, I., 682 (Lep.)
 — & Tanabe, B., 717 (Y. & S.)
 Schoen, R., with Levaditi, Anderson & Selbie, 695 (R.F.)
 —, with — & Lépine, 251 (Rab.)
 —, with —, Sanchis-Bayarri & Lépine, 283, 285 (Z.)
 Schoening, H. W., 754 (Rab.)
 Schotter, H., 204 (Mal.)
 Schourenkova, A. I. & Demina, N. A., 279 (Z.)
 —, — & Pavlova, P., 913 (Z.)
 —, with Marzinovskiy, 912 (Z.)
 Schoute, E., with de Buck & Swellengrebel, 647 (Mal.), 910 (Z.)
 —, with Swellengrebel & de Buck, 304 (Z.)
 Schreiber, G., 405 (Dys.)
 Schrumpf-Pierron, 393 (Am.)
 Schubert, J., 796 (Dys.)
 Schüffner, W., 702 (Lept.)
 — & Snyders, E. P., 54 (Misc.)
 Schüffner, W. A. P., 118 (Lept.)
 —, with Dinger, Snyders & Swellengrebel, 485, 486, 869, 870 (Y.F.)
 —, Korteweg, P. C. & Swellengrebel, N. H., 648 *bis* (Mal.)
 Schujman, S., with Fidanza & Fernandez, 680 (Lep.)
 Schultz, E. W., 561 (Misc.)
 Schultz, L. J., 61 (Misc.)
 Schulz, R. E., with Skryabin, Sserbinoff & Smirnof, 442 (Hel.)
 Schumaker, E., 894 (Z.)
 —, with Hegner, 273 (Z.)
 Schut, J., 734 (Pl.)
 Schütze, H. & Hassanein, M. A., 8 (Pl.)
 Schuurman, C. J. & Huinink, A. S. B., 582 (Misc.), 893 (Z.)
 —, with Walch, 640 *bis* (Mal.)
 Schwarz, A. L., with Umidowa, 278 (Z.)
 Schweinburg, F., 751 (Rab.)
 —, with Löffler, 751 (Rab.)
 Schwentker, F. F., 566 (Misc.)
 Schwetz, J., 3 (Pl.), 679 (Lep.), 917 (Z.)
 — & Baumann, H., 644 (Mal.)
 — & Fornara, L., 852 (S.S.)
 —, — & Collart, A., 731 (Pl.)
 Schwob, R., with Chevallier, 202 (Mal.)
 Scordia, F., with Bignelli, 573 (Misc.)
 Scott, J. A., 422 *bis* (Hel.)
 Scott, L. C., Turner, R. H. & Mayerson, H. S., 777 (Pel.)
 Scrinzi, E., with Sepulcri, 908 (Z.)
 Seale, E. R., with Michael, 527 (Der.)
 Sébenzow, B. M. & Adowa, A. N., 298 (Z.)
 Sédan, J., 503, 1012 (Oph.)
 Segal, M. & Bloch, J., 207 (Mal.)
 Seguin, P., 700 (R.F.)
 Seidelin, H., 497 (Y.F.), 592 (Misc.)
 Seiffert, W., with Uhlenhuth, 121 (Lept.)
 Seki, Y., 257 (Rab.)
 Selbie, F. R., with Levaditi, Anderson & Schoen, 695 (R.F.)
 Sella, M., (600) (Misc.)
 Sellards, A. W., 490, 491 (Y.F.)
 Selwyn-Clarke, P. S., 497 (Y.F.)
 Sémenoff, G., 448 (Hel.)
 Semeraro, A., 724 (C.Bu.)
 Sen, G. N., with Napier, 615 (K.A.)
 Sen, P. B., with Brahmachari & Banerjea, 613 (K.A.)
 Sensenich, R. L., with Giordano, 539 (Und.)
 Sepulcri, P., with Scrinzi, E., 908 (Z.)
 — & Vidale, E., 307 (Z.)
 Sergeant, Edm., 367 (Lab.), 882 (Z.)
 —, Donatien, A., Parrot, L. & Lestoquard, F., 289 (Z.)
 —, Sergeant, Et. & Catanei, A., 893 (Z.)
 —, — & Parrot, L., 299 (Z.)
 Sergeant, Et. & Parrot, L., 312, 323 (Z.)
 —, with Sergeant, Edm. & Catanei, 893 (Z.)
 —, with — & Parrot, 299 (Z.)
 Serio, F., (220) (Mal.)
 Sertschannov, L. K., with Plotnikov, 442 (Hel.)
 Seshadrinathan, N., with Vasudevan, 522 (Der.)
 Sezary, A., 681 (Lep.)
 —, Dérot, M. & Guédé, M., 336 (Lep.)
 Sfameni, M., 386 (Am.)
 Shackle, J. W., 348 (Sp.)
 Shaha, B., 184 (Mal.)
 Shan, C. P., with Nakamura, (406) (Dys.)
 Shannon, R. C., 293, 902, 912 (Z.)
 —, Burke, A. W. & Davis, N. C., 905 (Z.)
 — & Davis, N. C., 905 (Z.)
 —, with —, 482, 484 *bis* (Y.F.)
 Sharp, N. A. D., 991 (Hel.)
 Shastid, T. H., 26 (Oph.)
 Shattuck, G. C., 570 (Misc.)
 Sheard, C., with Goeckerman & Osterberg, 529 (Der.)
 Shedrow, A., (803) (Am.)
 Shelley, H. M., 226 (S.S.)
 Sheplar, A. E., with Heyd, 781 (Am.)
 Shevchenko, F. I., 622 (K.A.)
 Shiga, K., 339 *bis* (Lep.)
 Shiiba, Y. & Matsuoka, K., 799 (Dys.)
 Shipley, P. G., with Peña Chavarria, 518 (Der.)
 Shircore, J. O., 712 (Y. & S.)
 Shiroki, T., 761 (Bb.)
 Shortt, H. E., 608 (K. A.)

- Shortt, H. E., Craighead, A. C., Smith, R. O. A., d'Silva, H. A. H. & Das, S., 616 (K.A.)
 —, —, — & Swaminath, C. S., 95, 604 *bis*, 605 (K.A.)
 —, Smith, R. O. A., d'Silva, H. A. H. & Swaminath, C. S., 604 (K.A.)
 Shoung, A., with Jolly & da Costa, 856 (Chl.)
 Shrivastava, D. L., with Hughes, 652 (Mal.)
 Shute, P. G., with James & Nicol, 181, 183 (Mal.)
 Sicé, A., 226, 819 *bis*, 820, 822, 823, 842 (S.S.)
 — & Boisseau, R., 237 (S.S.), 794 (Dys.)
 Sikes, E. K., 919 (Z.)
 Silberstein, W., with Schnitzer, 235 (S.S.)
 da Silva, E. P., 258 (Rab.)
 —, with Bettencourt, 457 (Hel.)
 Silva, F., 515, 521 (Der.)
 d'Silva, H. A. H., with Shortt, Craighead, Smith & Das, 616 (K.A.)
 —, with —, Smith & Swaminath, 604 (K.A.)
 Silverman, D. N., (803) (Dys.)
 Simic, T., (938) (Z.)
 Simmons, J. S., 303 (Z.)
 —, St. John, J. H. & Reynolds, F. H. K., 552 *bis* (Fev.)
 —, with — & —, 552 *bis* (Fev.)
 Simons, C., with Lampe, 672 (Lep.)
 Sinclair, C. W., 924 (Z.)
 Sinderson, H. C., 962 (Hel.)
 Sinicco, S., 978 (Hel.)
 Sinton, J. A., 183, 184, 189, 656 (Mal.), 898 (Z.)
 —, Smith, S. & Pottinger, D., 656 (Mal.)
 Sirca, A., 215 (Mal.)
 Siro, F. & Ferruccio, C. R., 671 (Lep.)
 Sitsen, A. E., 79, 157 (Misc.)
 Skrjabin, K. I., Schulz, R. E., Sserbinoff, P. I. & Smirnov, G. G., 442 (Hel.)
 van Slee, W., 986 (Hel.)
 Slot, J. A., 703 (Lept.)
 de Smidt, F. P. G., 7 (Pl.)
 Smillie, W. G., 992 (Hel.)
 Smirnov, G. G., with Skrjabin, Schulz & Sserbinoff, 442 (Hel.)
 Smith, F. F. S., 24 (Oph.)
 Smith, F. L., 401 (Dys.)
 Smith, J. & Fraser, A. M., 793 (Dys.)
 —, with —, 793 (Dys.)
 — & Murphy, J. F., 753 (Rab.)
 Smith, R. O. A., 324, 898 (Z.)
 —, with Shortt, Craighead, d'Silva & Das, 616 (K.A.)
 —, with —, d'Silva & Swaminath, 604 (K.A.)
 —, with —, Craighead & Swaminath, 95, 604 *bis*, 605 (K.A.)
 Smith, S., 207 (Mal.)
 —, with Sinton & Pottinger, 656 (Mal.)
 Smith, T., 536 (Und.)
 Smithies, F., 417 (Hel.)
 Smorodinzew, I. A. & Adowa, A. N., 912 *bis* (Z.)
 Smyrniotis, P. C., 461 (Hel.)
 Snijders, E. P., 384 (Am.), 487 (Y.F.)
 —, with Dinger, Schüffner & Swellengrebel, 485, 486, 369, 870 (Y.F.)
 Snyders, E. P., with Schüffner, 54 (Misc.)
 Sociedad Argentina de Patología Regional del Norte, 863, 952 (B.R.)
 Soeleiman, M. M. & van Niekerk, J., 859 (Chl.)
 Soesilo, R., (938) (Z.)
 —, with Walch, 909 (Z.)
 Soewandi, with Bonne, 895 (Z.)
 Sofiev, M. S. & Shevchenko, F. I., 622 (K.A.)
 Sofiew, M. S., 924 (Z.)
 Sokhey, S. S., 370 (Lab.)
 — & Gokhale, S. K., 343 (Sp.)
 — & Malandkar, M. A., 343 (Sp.)
 Solotnikow, I., 306 (Z.)
 Sonnenschein, C., 1007 (Lep.)
 Sorel, F., 591 (Misc.)
 — & Armstrong, I., (10) (Pl.), 867 (Y.F.)
 Sorge, G., (406) (Dys.), 611 (K.A.)
 Sorour, M. F., 957 (Hel.)
 Soru, E., 859 (Chl.)
 Souchard, L., 855 (Chl.)
 South Africa, Union of, 40 (Misc.), 669 (Lep.)
 South African Institute for Medical Research, 367 (Lab.)
 de Souza-Araujo, H. C., 684 (Lep.)
 de Spuza, M. A., 262 (Rab.)
 Sparmann, R., 54 (Misc.)
 Speedy, W. D. & Adhikari, A. K., 637 (Mal.)
 Spindler, L. A., 965, 972, 975 (Hel.)
 —, with Cort & Otto, 973 (Hel.)
 Sprehn, C., 984 (Hel.)
 Srinivassane, with Labernie, 1009 (Lep.)
 Ssavatejev, A., 755 (Rab.)
 Ssawatejew, A. I. & Ssidorow, N. W., 253 (Rab.)
 Sserbinoff, P. I., with Skrjabin, Schulz & Smirnov, 442 (Hel.)
 Ssidorow, N. W., with Ssawatejew, 253 (Rab.)
 Ssinjuschina, M. N., 124 (Lept.)
 Ssolowjewa, J. W., with Glusmann & Predtetschenskaja, 747 (Rab.)
 Staff of the Haffkine Institute, with Mackie & Fairley, 343 (Sp.)
 Stähelin, A., 979 (Hel.)
 Staley, J., with Marshall, 300, 301 (Z.)
 Stanley, L. L., Garfinkle, F. E. & Goddard, W. P., 794 (Dys.)
 Stannus, H. S., 766 (Pel.)
 Starr, P., with Holmes, 347 (Sp.)
 van Steenis, P. B., 149 (Fev.)
 —, with Marwits, 386 (Am.)
 Steenson, K. R., with Hetherington, 169 (Misc.)
 Stefanopoulo, G., 141 (Fev.)
 — & Hosoya, S., 706 (Lept.)
 —, with Pettit, 488, 489, 875 (Y.F.)
 —, with — & Roubaud, 874 (Y.F.)
 Stéhelin, with Brulé, 120 (Lept.)
 Stein, A. A., 676 (Lep.)
 Stein, A. K., with Pawlowsky, 322, 361 (Z.)
 Steinfeld, F., 214, 650 (Mal.)
 Stekhoven, J. H. S., Jr., 978 (Hel.)
 Stern, F., 721 (Y. & S.)
 Steudel, 249 *bis*, 250, 854 *bis* (S.S.)
 Stieben, W., (551) (Und.)
 Stiles, C. W. & Collins, B. J., 920 (Z.)
 Stirbu, A., with Ciuca, Ballif & Vieru, 203 (Mal.)
 Stockman, R., 571 (Misc.)

- Stoll, N. R., 971 *bis* (Hel.)
 —, with Cort & Schapiro, 421 (Hel.)
 —, with —, — & Riley, 440 (Hel.)
 —, with —, Sweet, Riley & Schapiro, 431 (B.R.)
 Stookes, V. A., 897 (Z.)
 Stover, N. M., with Stuart, (600) (Misc.)
 Strasburger, J. & Thill, O., 119 (Lept.)
 Strickland, C., 181, 213 (Mal.), 318 (Z.)
 —, with Choudhury, K. L. & others, 666 (Mal.)
 — & Chowdhury, K. L., 903 (Z.)
 — & Roy, D. N., 731 (Pl.)
 Struthers, E. B., 91 (K.A.)
 Struwe, F., with Grabow, 128 (R.B.F.)
 Stuart, E. & Stover, N. M., (600) (Misc.)
 Stutzer, M., 19 (Chl.)
 Suarez, R. M., (600) (Misc.)
 Sudan, 962 (Hel.)
 Suenaga, D., with Matsushima, Taguchi & Ohya, 206 (Mal.)
 Suk, V., 80 (Misc.)
 Sukhavanam, B., (474) (Hel.)
 Sumatra, 55 (Misc.)
 Sundararajan, E. R., with Russell, 13, (21) (Chl.)
 Sur, P., with Iyengar, 205 (Mal.)
 Sur, S. N. & Ghosh, B., 190 (Mal.)
 — & Sarkar, H., (600 *bis*) (Misc.)
 Sur, T. N., 534 (Myc.)
 Surbek, K. E., 184, 205 (Mal.)
 Surraco, N. L., with Plá & Talice, 1027 (B.R.)
 Suzuki, S., 440 (Hel.)
 Swaminath, C. S., with Shortt, Craighead, & Smith, 95, 604 *bis*, 605 (K.A.)
 —, with —, Smith & d'Silva, 604 (K.A.)
 Swanidse, D., 443 (Hel.)
 Sweeney, M. A., 291 (Z.)
 Sweet, W. C., with Cort, Stoll, Riley & Schapiro, 431 (B.R.)
 Swellengrebel, N. H., 196 (Mal.), 305, 321 (Z.)
 —, de Buck, A. & Schoute, E., 304 (Z.), 647 (Mal.)
 —, with — & —, 910 (Z.)
 —, with Dinger, Schuffner & Snijders, 485, 486, 869, 870 (Y.F.)
 — & Doornbos, W. H., 302 (Z.)
 —, with Schuffner & Korteweg, 648 *bis* (Mal.)
 Swynnerton, C. F. M., 914, 915 (Z.)
 Symes, C. B., 729 (Pl.), 906 (Z.)
- T**
- Taddia, L., 784 (Am.)
 Taguchi, S., with Matsushima, Suenaga & Ohya, 206 (Mal.)
 Tait, C. B. V., with Manson-Bahr, 378 (Am.)
 Takahashi, K., Chuan, L. T., To, Y. C., Tsuchiya, K. & Abiko, A., 9 (Pl.)
 Takahashi, S., 960 (Hel.)
 Takaya, Y., 256 (Rab.)
 Takeda, S., 403 (Dys.)
 Takeda, T., 803 (Dys.)
 Takino, M., with Saijo, 677 (Lep.)
 Talbot, 22, 1012 (Oph.)
- Taliaferro, W. H., 430 (B.R.)
 — & Taliaferro, L. G., 288 (Z.)
 Talice, R. V., 322, 323 (Z.), 531 (Myc.), 924 (Z.)
 —, with Plá & Surraco, 1027 (B.R.)
 Tampi, K. R., 326 (Lep.)
 Tanabe, B., 717 (Y. & S.)
 —, with Schöbl, 717 (Y. & S.)
 Tanabe, M. & Chiba, E., 391 (Am.)
 Tang, F. F., 1011 (Oph.)
 Tanganyika Territory, 366, 914, 915 (Z.), 942 (Lab.)
 Tarassow, S., with Epstein, 119 (Lept.)
 Tardieu, 69 (Misc.)
 Tate, P., 517 (Der.)
 Taylor, E. L. & Baylis, H. A., 961 (Hel.)
 Taylor, F. H., 311, 898 (Z.)
 Taylor, G., 171 (Misc.)
 Taylor, K. P. A., 359 (Z.)
 Taylor, M. R., (938) (Z.)
 Tedeschi, C., 528 (Der.), 607 (K.A.)
 Teitge, H., 278 (Z.)
 Teixeira, J. C., 477 (Y.F.)
 Teodosiu, T., with Ionesco, 252 (Rab.)
 Terdschanian, A., 194 (Mal.)
 Than-Trong-Phuoc, with de Langibaudière, 785 (Am.)
 Thaysen, T. E. H., 348 (Sp.)
 — & Norgaard, A., 351 (Sp.)
 Theiler, M., 872 (Y.F.)
 Theodor, O., with Adler, 89 (K.A.)
 van Thiel, P. H., 469 (Hel.)
 Thiéry, J., 252 (Rab.)
 Thill, O., with Strasburger, 119 (Lept.)
 Thiroux, 1, (10) (Pl.)
 Thiroux, A., 3, 732 (Pl.)
 Thiry, U., with Bessemans, 125 (Lept.)
 Thomas, J. A., with Williams, 380 (Am.)
 Thompson, W. R., 860 (B.R.)
 Thomsen, O., 725 (C.Bu.)
 Thomson, D. & Thomson, R., 432 (B.R.)
 Thomson, J. G., 49 (Misc.)
 —, with Macfie, 282 (Z.)
 Thonnard-Neumann, 187 (Mal.)
 Thornton, C. V., 154 (Misc.)
 Tilden, E. B., with Muller, 478 (Y.F.)
 —, with Noguchi, Muller & Tyler, 153 *bis* (Fev.)
 Timpano, P., (474) (Hel.)
 Tiprez, J., with Avinée, 973 (Hel.)
 Tirouvanziam, 711 (Y. & S.)
 Tisseuil, J., 269 (Z.), 333, 671, 685, 1008 *bis* (Lep.)
 Tkeschelaschwili, K. & Tschilingaroff, 104 (K.A.)
 To, Y. C., with Takahashi, Chuan, Tsuchiya & Abiko, 9 (Pl.)
 Todd, J., 694 (R.F.)
 Todd, K. W., 717 (Y. & S.)
 Tomb, J. W., 17 (Chl.)
 — & Maitra, G. C., 14 (Chl.)
 Tonking, H. D., 445 (Hel.)
 Torres, C. M., 477 *bis* (Y.F.)
 — & de Azevedo, A. P., 247 *bis* (S.S.)
 Torres, O., with de Araujo, 400 (Dys.)
 Torres, S., 749 (Rab.)
 Torres Lopez, A. J., with Lopez-Neyra, 445 (Hel.)
 —, with Rodriguez Lopez-Neyra, 965 (Hel.)

Torrioli, M., 208 (Mal.)
 Tournier, E., 341 (Lep.)
 Trabaud, J., 58 (Misc.)
 Trabaud, Khaiat, H. & Sabbagh, A., 394 (Dys.)
 Tramini, J., 502 (Oph.)
 Transactions of the Royal Society of Tropical Medicine & Hygiene, 376, 377 (Lab.)
 Tran-van-Manh, with Chesneau, 914 (Z.)
 Trapesontzewa, C., 1012 *bis* (Oph.)
 Traut, I. I., 320 (Z.)
 Traut, I. I. *et al*, 168 (Misc.)
 Travassos, J., with Monteiro, 878 *bis* (Y.F.)
 Travassos, L., 899 (Z.)
 Trens, F., 911 (Z.)
 Tribouillet, P. H., (600) (Misc.)
 Trinh-Huu-Loi, with Truong-Dinh-Tri, 185 (Mal.)
 Triolet, R., (342) (Lep.)
 Tripoli, C. J., 390 (Am.)
 —, with Johns, 380 (Am.)
 Troise, E., 362 *bis* (Z.)
 Troisier, J., Leon-Kindberg & Monnerot-Dumaine, M., 119 (Lept.)
 Trolli, 33 (Misc.)
 Truong-Dinh-Tri & Trinh-Huu-Loi, 185 (Mal.)
 Tscherikower, R. S. & Rubinstein, P. L., 577 (Misc.)
 Tschilingaroff, with Tkeschelaschwili, 104 (K.A.)
 Tschirejkin, W. C., 695 (R.F.)
 Tscholaria, D., 773 (Pel.)
 Tsuchiya, K. & Chuan, L. T., 733 (Pl.)
 —, with Takahashi, Chuan, To & Abiko, 9 (Pl.)
 Tsunashima, Y., 417 (Hel.)
 Tsurumi, M., 741 *bis* (Pl.)
 Tsykalas & Riegl, R., 459 (Hel.)
 Tupa, A., 253 (Rab.)
 Turner, R. H., with Jones, 388 (Am.)
 —, with Scott & Mayerson, 777 (Pel.)
 Turriès, with Boinet & Poursines, 382 (Am.)
 Tyler, J. R., with Muller, 557 (Fev.)
 —, with Noguchi, Muller & Tilden, 153 *bis* (Fev.)
 Tzekhnovitzer, M. & Goldenberg, J., 252, 749 (Rab.)

U

Uhlendorf, E., 157 (Misc.)
 Uhlenhuth, P. & Seiffert, W., 121 (Lept.)
 Uhry, P., with Meyer & Oferlé, 775 (Pel.)
 Ukil, A. C., 19 (Chl.), 402 (Dys.)
 — & Guha Thakurta, S. R., 857 (Chl.)
 Ullmann-Apostolon, R. & Apostolon, G., 211 (Mal.)
 Umanskaja, R. M., with Belezki, 115 (R.F.)
 Umar, M., 92 (K.A.)
 Umidowa, S. I. & Schwarz, A. L., 278 (Z.)
 United Fruit Company, 52 (Misc.), 186 (Mal.)
 Urbain, A., 533 (Myc.)
 —, with Marie, 255, 745 (Rab.)
 Urchi, O., 790 (Am.)

V

Vaccarezza, A. J., with Molinelli, 341, 685, 1002 (Lep.)
 Vadivelu, K., with Hirst, 319 (Z.)
 Valenzuela, A. J., 68 (Misc.)
 Valtis, J. & Markianos, J., 686 (Lep.)
 Van den Branden, F., 228, 230, 831 (S.S.), 388 (Am.)
 Vardon, A. C., with Morison, 560 (Misc.)
 Vassiliadis, P., with Bruynoghe, 280 (Z.)
 Vasudevan, A. & Seshadrinathan, N., 522 (Der.)
 Vatchaghandy, S. B., 103 (K.A.)
 Vaucel, 826 (S.S.)
 Vaz, E., 400 (Dys.)
 Vedder, A., with de Moor, 694 (R.F.)
 Vegni, R., 134, (137) (Und.)
 da Veiga, A., 515 (Der.)
 Velasco, F. I., Alonso, J. M., Limkako, G. & Fernandez, G., with Del Rosario, F. T., 334 (Lep.)
 Vellard, J., 358, 361 *bis*, 930, 931 (Z.)
 — & de Assis, A., 361 (Z.)
 — & Vianna, M. M., 876 (Y.F.)
 Velu, H., Balozet, L. & Zottner, G., 696 (R.F.)
 Venturi, L. C., 233 (S.S.)
 de Vera, B., 341 (Lep.)
 — & Lara, C. B., 335 (Lep.)
 Verbunt, J. A. M., with Brug, Haga & van Joost, 1009 (Lep.)
 Vercellana, G., 132 *bis* (Und.)
 Verdon, P., with Newcomb, 26 (Oph.)
 Verghese, G., 759 (Bb.)
 zur Verth, M., with Ruge & Mühlens, 175 (B.R.)
 Viala, J., 261 (Rab.)
 Vialatte, E. F. C. & Remortet, J. E., 573 (Misc.)
 Vianna, M., 261 (Rab.)
 —, with Vellard, 876 (Y.F.)
 Viar, J., (220) (Mal.)
 Vidale, E. & Sepulcri, P., 307 (Z.)
 —, with —, 307 (Z.)
 Vieira, F. B., 394 (Dys.)
 Vieru, M., with Ciuca, Ballif & Stirbu, 203 (Mal.)
 Vigne, Assada & Audier, 101 (K.A.)
 Vigne, P., 623 (K.A.), 1009 (Lep.)
 — & Fournier, A., 102 (K.A.)
 Villain, G., 662 (Mal.)
 — & Krouch, M., (220) (Mal.)
 Villard, H., 28 (Oph.)
 Villela, E. L., with Jakob & Fialho, 869 (Y.F.)
 Villiger, E., 977 (Hel.)
 Vinogradoff, 443 (Hel.)
 Vint, F. W., 35 (Misc.)
 Visser, J. W., 277 (Z.)
 Viswalingam, A., 769 (Pel.)
 Vitzthum, H. G., 922 (Z.)
 Vogel, H., 955 *bis*, 960 *bis*, 991 (Hel.)
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